Turkey’s top publications in cardiovascular medicine in the past 25 years: evaluation of its impact

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ABSTRACT

Objective: To identify “genuine” publications from Turkey’s institutions since 1992 that have cumulatively contributed the most to global cardiovascular medicine.

Methods: Based on data from the Web of Science, 146 publications from Turkey were identified having received ≥50 citations as of late July, 2017. Papers with more than a minor share by international authors were excluded.

Results: Hundred and ten primary authors generated 147 medical papers which received ≥50 (interquartile range, 54; 86) citations. These articles corresponded in quality to the top 12% global papers. Half of the articles were published from 2002 to late 2007, with a median exposure period of 12 years. Peak performance was reached in 2004–07, with a mean of 15–20 papers annually, which then regressed to five papers in 2008–13, representing an estimated 50% decline. Cardiology generated 105 articles (20 in collaboration with other branches), cardiovascular surgery generated 27 articles, and pediatric cardiology generated 5 articles. Publications arose from 26 medical faculties, Gülhane Military Academy, and 9 hospitals not which were not academically affiliated. The performance of many related Turkish institutions was disappointing.

Conclusion: Turkey’s contribution to cardiovascular medicine has further declined slightly in the current assessment, particularly since 2007. To prevent a further gap in Turkey’s contribution to the field, an undelayed return is needed by building an environment that allows focusing on research with a potential to contribute to medicine. (Anatol J Cardiol 2017; 18: 417-24)

Keywords: Contribution to cardiovascular medicine, history of medicine, medical research in Turkey

Introduction

Economic growth of a country depends on added-value production as much or more than manpower and capital. The former when transposed to science or specifically, to medicine is congruent with research output. The impact of this output somewhat parallels the entire base, but is significantly driven by top publications.

Adoption of appropriate indicators of activity of scientific publication is required for appropriate assignment of national resources (1). In this connection, the number of publications with “top” citations rather than the overall number of citations is a better or the best indicator of contribution to science with respect to scientific institutions or countries (2). Currently, one-fifth of the 1 million scientific papers are coauthored by researchers collaborating internationally (3). Multiauthored international publications have substantially increased in recent years, such that less than one-fifth of scientific publications have a single author, >600 papers are published with >100 authors (4). Though one may agree that best results in science come from international collaboration (3,5), the advantage of this practice favors the restricted growth potential of advanced economies, whereas the growth potential of domestic publications in emerging economies is still great. Hence, for communities emerging in medical research, increasing proportion of internationally “collaborative” papers and their acquired citations is a major confounder compared with research “genuinely” originating from native institutions. In Turkey, I have documented that an overwhelming proportion of Turkey’s contribution to medicine belonged to internationally “collaborative” papers, which does not reflect a sustainable capacity (6).

This article aims 1) to identify prominent publications (on the basis of citations as an indicator of contribution to cardiovascular medicine) in the past 25 years derived from native academic institutions and hospitals and their primary authors and 2) to evaluate the trend of such activity in Turkey in the period under study.

Methods

Data from Thomson Reuters Web of Science (Core Collection) served to obtain current citations using “Turkey or Türkiye”
Table 1. 147 articles from Turkey with highest “genuine” contribution to cardiovascular medicine: information on field, institution and reference

| Cites | Authors | Field     | Inst. | Topic                              | Journal                  | Year & reference |
|-------|---------|-----------|-------|------------------------------------|--------------------------|------------------|
| 392   | Abacı A, Oğuzhan A, Kahraman S & | Card | Erc | Coronary collaterals              | Circulation              | 1999: 99: 2239-42 |
| 233   | Kalay N, Başar E, Özdoğru İ & | Card-Onc | Erc | Carvedilol-cardiomyopathy        | J Am Coll Cardiol        | 2006: 48: 2258-62 |
| 222   | Onat A, Ceyhan K, Başar Ö & | Card | CP Ş | Metabolic syndrome                | Atherosclerosis          | 2002: 165: 285-92 |
| 188   | Onat A | Card     | CP Ş | Cardiovascular disease            | Atherosclerosis          | 2001: 156: 1-10  |
| 176   | Tokgözüoğlu SL, BaturMK, Topcuog MA & | Card | HT  | Stroke localization               | Stroke                   | 1999: 30: 1307-1 |
| 174   | Tarkun İ, Çetinarslan B, Cantürk Z & | End-Card | Kocaeli | PCOS: inflammation               | J Clin Endo Metab       | 2004: 89: 5592-6 |
| 158   | Onat A, Şahidum-Avcı G, Barlan MM & | Card | CP Ş | Visceral adiposity                | Int J Obes               | 2004: 28: 1018-25|
| 150   | Eren M, Görgülü Ş, Uslu N & | Card | Ersek | Aortic stiffness in HT, DM        | Heart                    | 2004: 99: 37-43 |
| 150   | Aytemir K, Özer N, Atalar E & | Card | HT   | P-wave dispersion                 | PACE                     | 2000: 23: 1109-12|
| 145   | Kosecik M, Erel O, Sevinc E & et al. | Ped. C | Harran | Children & passive smoking        | Int J Cardiology         | 2005: 100: 61-4  |
| 133   | Onat A, Uyarlê H, Hergenç G & | Card | CP Ş | Úric acid & metab synd            | J Am Hypertens           | 2006: 19: 1055-62|
| 130   | Sezgin AT, Siğirli A, Barutçu İ & | CVS | Başkt | Slow coronary flow                | Nutr Met Cardiov Dis     | 2009: 19: 211-7  |
| 122   | Tüzün H, Beşirli K, Sayın A & | CVS | Ersek | Aortic stiffness in HT, DM        | Heart                    | 2004: 99: 37-43 |
| 118   | Eroğlu S, Sade LE, Yıldırım A & | Card | Erciye | Depression & defibrillator         | PACE                     | 2006: 29: 619-26 |
| 115   | Yaralı H, Yıldırım A, Aybar F & | Gyn-C | HT   | Polycystic ovary syndr.           | Fertil Steril            | 2001: 11: 511-6  |
| 114   | Çelik T, İyisoy A, Kursaklioglu H & | Card | GATA | Effect on oxidat. stress          | J Hypertension           | 2006: 24: 591-6  |
| 113   | Yazici S, Yazici M, Erer B & et al. | PhM-C | Düzce | Platelet indices in rheumatoid arthr. | Platelets                | 2010: 21: 122-25 |
| 109   | Aras D, Tepekçıog, Kumral E & | Card | Koşuy | Valvar thrombosis                 | J Am Coll Cardiol        | 2000: 35: 1881-9 |
| 109   | Gövener M, Paşaoğlu I, Demircin M | CVS | HT   | Postop hyperglycemia              | Endocrine J              | 2002: 49: 531-7  |
| 108   | Taşdemir O, Vural KM, Karagöz H & | CVS | TYIH | Cardiac surgery without bypass    | J Thor Cardiov Surg      | 1998: 116: 68-73|
| 107   | Özen EE, Güneri S, Akdeniz B & | Card | 9Eyl | Radiocroast nephropathy           | Am Heart J               | 2007: 154: 539-44|
| 106   | Tavil Y, Şen N, Yazici HU & et al. | Card | Gazı | Mean platelet vol. MetS.CAD       | Thromb Res               | 2007: 120: 245-50|
| 105   | Ökutan H, Ozcilik N, Yilmaz HR & et al. | CVS | Demirel | Caffeic acid & lipid peroxidation | Clin Biochem             | 2005: 38: 191-96 |
| 104   | Erdoğan D, Güllü H, Yıldırım E & | Card | Demir | Low bilirubin; carotid IMT        | Atherosclerosis          | 2006: 184: 431-7 |
| 103   | Onat A, Uyarlê H, Hergenç G & | Card | CP Ş | Abdominal obesity                 | Atherosclerosis          | 2007: 191: 182-90|
| 102   | Demirkuç U, Kuralay E, Yeniscusu M & | CVS | GATA | Postop renal failure              | J Cardio Surg            | 2004: 19: 17-20  |
| 95    | Farsak B, Yıldırım A, Akyon Y & | CVS | HT   | Bacterial DNA in plaques          | J Clin Microbiol         | 2000: 38: 4408-11|
| 93    | Özaydin M, Varol E, Aslan SM & | Card | Demirel | Statin- atr.fibrillation          | Am J Cardiol              | 2006: 97: 1490-3 |
| 92    | Özer N, Yavuz B, Can İ & | Card | HT   | Doppler; T-wave dispersion        | J Am Soc Echocard        | 2005: 18: 945-8  |
| 91    | Durdu S, Akar AR, Arat M & et al. | CVS | Ank U | Thrombangit. oblit. Cell transplant. | J Vasc Surg               | 2006: 44: 732-9  |
| 90    | Erdoğan D, Güllü H, Çalışkan M & | Card | Demir | Uric acid; endothel functn        | Int J Clin Pract         | 2005: 59: 1276-82|
| 89    | Şenaran H, İleri M, Atınbaş A & | Hem-Card | Fatih | Platelet vol.-CAD                 | Clin Cardiol             | 2001: 24: 4405-8 |
| 89    | Akpek M, Kaya MG, Lam YY & | Card | Erciye | Neut/Lympho-coron. flow           | Am J Cardiol              | 2012: 110: 621-7 |
| 88    | Ilgãoz K, Ozbun B, Demircan S & | Card | Çapa | Depression & defibrillator        | PACE                     | 2006: 29: 619-26 |
| 86    | Uyarlê H, Ergolen M, Çiçek G & | Card | B’esir | Redcell distr width, prognosis    | Coron Artery Dis         | 2011: 22: 138-44 |
| 86    | Ak K, Isbir CS, Tektik S & et al. | CVS | Marmara | Algorithm blood product use after CABG: | J Cardio Surg            | 2009: 24: 4404-10|
| 86    | Dursunoğlu D, Evrengül H, Polat B & | Card | Pamukk. | Lp(a) and lipids in rheumatoid arthritis | Rheumatol Int             | 2005: 25: 241-5 |
| 85    | Kayıkçıoğlu M, Tumuklu M, Özkahya M & | Card-Neph | Ege | Salt restrict.-End-st. renal dis. | Nephrol Dial Transpl      | 2009: 24: 956-62 |
| 84    | Onat A, Hergenç G, Sansoy V & | Card | CP Ş | Apo-III & coronary risk           | Atherosclerosis          | 2003: 168: 81-9  |
| 84    | Onat A, Aveçi G Ş, Şenocak M & | Card | CP Ş | Lipids in Turkey                  | J Epid Commun Hlth       | 1992: 46: 470-6  |
| 82    | Zorlu A, Bektaşoğlu G, Güven FM & | Card | Cumh. | Red cell distrib.width. pulm.embolism | Am J Cardiol              | 2012: 109: 128-34|

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| Cites | Authors | Field | Inst. | Topic | Journal | Year & reference |
|-------|---------|-------|-------|-------|---------|------------------|
| 82 | Özkay Y, Ökkan E, Şimşek B & | Ecz-Card | Gazi | Homocysteine and cysteine CHD RF | Int J Cardiol | 2002; 82: 269-77 |
| 82 | Hür E, Usta M, Toz H. et al. | Nphr-Card | Ege | Cardiovascular parameters in hemodialysis | Am J Kidney Dis | 2013; 61:957-65 |
| 81 | Kızıltepe U, Turan NN, Han U. et al. | CVS | Ankarpol | Resveratrol, spinal cord ischemia | J Vasc Surg | 2004; 40:138-45 |
| 81 | Sönmez B, Demirsoy E, Yağan N & | CVS | Nighting | Ablation: atrio-esophageal fistula | Ann Thorac Surg | 2003; 76:81-3 |
| 79 | Özyaydın M, Peker O, Erdoğan D & Card | Demir | Postop. Atrial fibrill. Rx | Eur Heart J | 2008; 29:625-31 |
| 77 | Kılıçkap S, Barista I, Akgul E. et al. | Onc.Card | HT | cTnT. anthracyclic cardiotoxicity | Ann Oncol | 2005; 16:798-804 |
| 76 | Kucur M, Isman FK, Karadag B. et al. | Biochem | CPγ | Serum YKL-40 levels in CAD | Coron Artery Dis | 2007; 18:391-6 |
| 75 | Dede DŞ, Yavuz B, Yavuz BB & | Card | HT | Alzheimer endothel. function | J Am Geriatr Soc | 2007; 55:1613-7 |
| 74 | Onat A, Hergenç G, Yüksel H & | Card | CPγ | Neck circ. Sleep apnea | Clin Nutr | 2009; 28:46- |
| 74 | Altun A, Üğur-Altun B. | Card-Endo. Trakya | Melatonin: therapeutic utilization | Int J Clin Pract | 2007; 61:835-45 |
| 73 | Erdoğan D, Yıldırım E, Çiftçi Ö & | Card | Demir | PreHT, cor. microvascular | Circulation | 2007; 115:593-9 |
| 73 | Doker E, Aydoğdu S, Özdemir M & Card | TYIH | Atrial fibrillation | Am J Cardiol | 1996; 77:96-8 |
| 72 | Kaya MG, Yarlıoğlu M, Günbakmaz Ö & Card | Erciy | Platel. activ; hypertension | Atherosclerosis | 2010; 209:278-82 |
| 72 | Sezer M, Oflaz H, Gören T. et al. | Card | Çapa | Intracoron.streptokinase p. primary PCI | N Engl J Med | 2007; 356:1823-34 |
| 71 | Kaya MG, Özkın M, Gınıbakımno & Card | Erciy | Nebivolol; anthrac.cardiomyopathy | Int J Cardiol | 2013; 167:2306-10 |
| 71 | Demirkol S, Balta Ş, Ünlü M & Card | GATA | Mean platelet vol. Syndr. X | Clinics | 2012; 67:1019-22 |
| 70 | Doğancı S, Demirkılcı U | CVS GATA | Laser & fibre Rx: saphen.varices | Eur J Vasc Surg | 2010; 40:254-9 |
| 70 | Sade LE, Eroğlu S, Bozbaş H & Card | HT | Epicardial fat-coron.reserve | Atherosclerosis | 2009; 204:580-5 |
| 69 | Yilmaz MI, Sönmez A, Çolaklar K & Card | GATA | Anthyp. Rx- adiponectin | Nephrology | 2007; 12:147-53 |
| 67 | Güray U, Erbay AR, Güray Y | Card | TYIH | Adhesion molecules | Int J Cardiol | 2004; 96:235-40 |
| 67 | Tüke T, Akkaya V, Demirel S. et al. Card. Çapa | Valsalva. P-dispersion in parox. AFib | Am J Cardiol | 2000; 85:896-9 |
| 66 | Turhan H, Saydam GS, Erbay AR, & Card | İnönü | Adhesion mol.-slow cor flow | Acta Cardiol | 2004; 59:127-33 |
| 66 | Kayıkcıoğlu M, Payzın S, Yavuzgıl O & Card | GATA | Statin in syndrome X | Eur Heart J | 2003; 24:1999-2005 |
| 65 | Onat A, Can G, Kaya H & Card | Ege | Adhesion index, vasc. events | J Clin Lipidol | 2010; 4:89-98 |
| 65 | Acan G, Akçay A, Sokmen A. et al. Card | K. maraş | Diast. function in diabetes | J Am Soc Echocard | 2009; 22:732-8 |
| 64 | Karabulut H, Toraman F, Evrenkaya S & CVS | Acibdl | Clopidogrel in CABB | Eur J Cardiothor Surg | 2004; 25:419-23 |
| 63 | Çalışman A, Pekdemir H, Çiçek D. et al. Card | Mersin | Endothelin-1, NO & slow coron. flow | Circ J | 2003; 67:1022-8 |
| 63 | Cin VG, Pekdemir H, Camsar A. et al. Card. Mersin | Coron. intimal thickening in slow cor. flow | Jap Heart J | 2003; 44:907-19 |
| 62 | Bahar I, Akgul A, Ozatik MA. et al. CVS | TYIH | Renal failure. open heart surgery | Perfusion-Uk | 2005; 20:957-65 |
| 62 | Erbil Y, Ademoglu E, Ozbey N & Card | Çapa | Vascular. P-dispersion in parox. AFib | Am J Cardiol | 2000; 85:896-9 |
| 61 | Özkan M, Doğan A, Varol E, & Card | HT | Postop. atr.fibrillation | Cardiology | 2007; 107:117-21 |
| 61 | Çalışkan M, Erdoğan D, Gülbü H & | Card | Demir | PreHT; cor. microvascular | Circulation | 2007; 115:593-9 |
| 61 | Onat A, Hergenç G, Yüksel H & | Card | HT | Neck circ. Sleep apnea | Clin Nutr | 2009; 28:46- |
| 61 | Yıldırır A, Kabakçı G, Akgül E & Card | HT | Smoking – diabetes/MetS | Atherosclerosis | 2007; 193:330-8 |
| 61 | Mercanoğlu F, Oflaz H, Öz O, & Card. Çapa | Endothelial dysfunction & perlodontitis | J Periodontol | 2004; 75:1694-700 |
| 61 | Özcan M, Gündüz S, Biteker M & Card | Koşuy | Thrombolysis.Valve thrombosis | JACC CV Imag | 2013; 6:206-16 |
| 60 | Toraman F, Karabulut EH, Alhan HC & CVS | Acibdl | Ablation: atrio-esophageal fistula | Ann Thorac Surg | 2003; 76:81-3 |
| 59 | Yavuz B, Ertuşcul DT, Çil H & Card | HT | Vitamin D Rosuvastatin | Cardiov DrugsTher | 2003; 22:295-9 |
| Cites | Authors                        | Field   | Inst. | Topic                                | Journal                      | Year & reference |
|-------|--------------------------------|---------|-------|--------------------------------------|------------------------------|------------------|
| 59    | Akdoğan A, Çalışgüner M, Yavuz B & | Card    | HT+   | FMF-Int-Med thickness               | J Am Coll Cardiol            | 2006; 48:2351-3  |
| 59    | Baruşçu I, Esen AM, Kaya D & | Card    | Koşuy | Smoking- HR variability             | Ann Noninv Electrocardiol    | 2005; 10:324-9   |
| 59    | Durmuş I, Yaşğd, T Çalışkavur T & | CVS     | Ege   | Prophyl. Dialysis at CABG           | Ann Thorac Surg              | 2003; 75:859-64  |
| 59    | Yavuzgül O, Altay B, Zoghi M & | Card    | Ege   | Endothel & erectile function        | Int J Cardiol                | 2005; 103:19-26  |
| 59    | Onat A, Can G | Card    | CPγ   | Autoimmune active.-chron disea..    | Curr Pharm Design            | 2014; 20:575-84  |
| 59    | Gür M, Aslan M, Yildiz A. et al. | Card.   | Harran| Paraoxonase & arylesterase in CAD   | Eur J Clin Invest             | 2006; 36:779-87  |
| 59    | Turhan H, Erbay AR, Yaşar AS & | Card    | İnönü | Adhesion mol. - cor ectasia         | Coron Artery Dis             | 2005; 16: 45-50   |
| 59    | Evrengül H, Dursunoğlu D, Çobankara V & | Card.   | Pamukk| Heart rate variabil. in rheumatoid arthr. | Rheumatol Int | 2004; 24: 198-202 |
| 59    | Gür M, Kirali K, Toke ME & | CVS     | Koşuy | CAGB method in COPD                 | Ann Thor Surg                | 2001; 71: 152-7   |
| 59    | Tokgozgoğlu S, Alıkaşifoğlu, Ünsal I & | Card    | HT    | Genotype & CAD risk                 | Heart                        | 1999; 81:518-22   |
| 59    | Tutar E, Eski F, Atalay S. et al. | Ped C   | Ankara| Preval. bicupsid aortic valve in newborns | Am Heart J                   | 2005; 150:513-5   |
| 59    | Turhan H, Erbay AR, Yaşar AS & | Card    | İnönü | CRP-cor. ectasia/CAD                | Am J Cardiol                  | 2004; 94:1303-6   |
| 59    | Kurtoglu N, Akçay A, Didar I | Card    | Koşu  | Dipropyramidol;slow cor. flow        | Am J Cardiol                  | 2001; 87:777-7    |
| 59    | Balta İ, Balta Ş, Demirkol S. et al. | Derm-Card| GATA  | High endocan. psoriasis             | Br J Dermatol                | 2013; 169:1066-70 |
| 59    | Sade LE, Demir Ö, Arar İ, & | Card    | HT    | Resyncronization; LV                | Am J Cardiol                  | 2008; 1:1163-8    |
| 59    | Çelik SK, Sağcan A, Altintıg A &. | CVS-Card. | Atakalp| Coron.dissections in atheroscl. pts  | Eur J Cardio-Thor Surg       | 2001; 20:573-6    |
| 59    | Ertürk S, Ertuğ AE, Ateş K & | Card-Neph| Ank   | Ambulat. BP monitoring              | Nephrol Dial Transpl         | 1996; 11:2050-4   |
| 59    | Özkan M, Emel Ö, Özdemir M & | Card    | Koşuy | Doppler echo in Behçet’s            | Eur Heart J                   | 1992; 12:6384-41  |
| 59    | Yılmaz O, Eser M, Şahiner A. et al. | Card    | 19 May| Syncope due to honey poisoning      | Resuscitation                | 2006; 68:405-8    |
| 59    | Demirbağ R, Yılmaz R, Koçyiğit A. | Card-Bioch. | Harran.| DNA damage, antioxidant capacity,CAD | Mutation Res                 | 2005; 570:197-203 |
| 59    | Kalko Y, Basaran M, Aydin U. & | CVS     | Vfk Gureba| Surgery for Behcet's aneurysms      | J Vasc Surg                  | 2005; 42:673-677  |
| 59    | Karagöz HY, Sönmez B, Bakkaloglu B & | CVS     | Gümven | CAGB without narcosis               | Ann Thor Surg                | 2000; 70: 91-6    |
| 59    | Başaran Y, Başaran MM, BabacanKF & | Card    | Koşuy | TFNα in coronary HD                 | Angiology                    | 1993; 44:332-7    |
| 59    | Akın A, Esmaoğlu A, Guler G, & | Ped C   | Erci  | Propofol in cardiac cath.            | Pediatr Cardiol              | 2005; 26:553-7    |
| 59    | Şen N, Afşar B, Özbanc F, & | Card    | MKemal| Neutrophil lymphocyte ratio in MI+OCI| Atherosclerosis              | 2013; 228:203-10  |
| 59    | Başaran Y, Tigen H, Karaahmet T | Card    | Koşuy | Fragmented QRS compl                | Echocardiography             | 2011; 28:62-8     |
| 59    | Sanişoğlu, Öktenli C, Hayami A. et al. | Pbh-Card. | GATA  | Preval. MetS-related disorders      | BMC Pub Health               | 2006; 8: 92       |
| 59    | Pamukçu B, Oflaz H, Öncül A& | Card    | Çapa  | Aspirin resist. & clopidogrel       | J Thrombolysis               | 2006; 22:103-10   |
| 59    | Atar İ, Konas D, Açıkel S, & | Card    | Başk  | Atrial fibril. In dialysis pts      | Int J Cardiol                | 2006; 106:47-51   |
| 59    | Dursunoğlu D, Dursunoğlu N, Evrengül H & | Card.   | Pamukk| Obstr.sleep apnooe & LV mass-function | Eur Respir J | 2005; 26:283-8    |
| 59    | Pamukçu B, Oflaz H, Nişancı Y | Card    | Çapa  | Platelet GpIIIa polymorphism        | Am Heart J                   | 2005; 149:675-80  |
| 59    | Yalçın F, Kaftan A, Müderrisoglu | Card    | Başk  | Ventr. filling: Doppler             | Heart                        | 2002; 87:336-9    |
| 59    | Onat A, Can G, Hergenc G. et al. | Card.   | CPγ   | Apo B. dyslipidemia, MetS & diabetes | Int J Obesity                | 2007; 31:1119-25  |
| 59    | Balta İ, Balta Ş, Koryürek ÖM. et al. | Derm-Card | GATA  | High endocan. psoriasis             | J Am Acad Dermat            | 2014; 70: 291-6   |
| 59    | Onat A, Can G, Rezvani R & | Card    | CPγ   | Complement C3-cardiomet risk        | Clin Chim Acta                | 2011; 412:1171-9  |
| 59    | Kozan Ö, Öğuz A, Abacı A & | Card    | Ege+  | MetS prevalence                      | Eur J Clin Nutr               | 2007; 61:548-53   |
| 59    | Kılıç T, Ural D, Ural E & | Card    | Kocaeli| Cytokine ratios prognosis after ACS  | Heart                        | 2006; 92:1041-6   |
| 59    | Koşar A, Kalko Y & | Card    | İnönü | Cytokine. chronic failure           | Eur J Heart Fail              | 2006; 8:270-4     |
| 59    | Tarkun İ, Çetinarslan B, Turemen E & | Endo-Card. | Kocaeli| Rosiglitazone & polycystic ovary symdr. | Eur J Endocrinol            | 2005; 153:115-21  |
| 59    | Kılıç Çamur N, Demircan R, Konuralp C & | Int Med | HışnNümp | Platelet vol.; predicting A,afMI   | Med Sci Monit                | 2005; 11: CR387-92|
| 59    | Çikim AS, Oflaz H, Ozbey N. et al. | Endo-Card. | İnönü-Çapa| Endothel. funct.subcl. hypo- & hyperthyroid. | Thyroid                    | 2004; 14: 605-9   |
| 59    | Ömeroğlu SN, Kirali K, Guler M. et al. | CVS     | Koşuyol| Bypass grafting without bypass      | Ann Thorac Surg              | 2000; 70: 844-9   |
citations, articles or reviews cited ≥50 were selected. “Genuine” contributions were defined when all first three authors of the paper worked in a Turkish university or hospital. All remaining “collaborative” articles were excluded. Following criteria were also need to be met to qualify: either the primary author had to be a cardiologist or the main topic was required to be on the field and publication was to be in a periodical confined to cardiovascular medicine. In total, 147 papers were identified.

In papers with coauthors from multiple institutions, the first author and his/her institution were credited and listed. With the purpose of precluding omission of some researchers in the address “Turkey,” some 50 primary authors known to me from a previous work (7) were also individually searched. For those authors who produced highly-cited papers (denoting a wider meaning than the same term used in the Web of Science) in two different institutions, citations received were assigned to the two institutions.

The closing index date in the current study for data retrieved from the Web of Science was late July, 2017. These data exclude intrinsically eligible citations to references incorrectly or inadequately provided and to periodicals not covered by the Web of Science. These excluded citations may be estimated to form a
share of 5%–10% of the Web of Science citations. Estimates of the expected distribution of “highly-cited” papers were based on the number of papers observed in 2005 and on the 10th percentile data provided by the Web of Science.

In assessing the rate of generation of such papers, the elapsed period from the index date of the median (25th and 75th percentiles) publication year was used and was compared with that of a work that preceded this study by 2 years (7).

**Results**

The number of “genuine” papers in cardiovascular medicine published in the previous quarter century that received ≥50 citations was 147. Overall citations received by these papers were 11,492. Table 1 comprises source information of these “genuine” articles.

Temporal distribution of the number of these publications is graphically presented in Fig. 1. The graph reveals that the publication of the papers had a median year (25th and 75th percentiles) of 2005 (from 2002 to late 2007). Expressed otherwise, the exposure period consisted of a median of 12 (IQR 9.5–15) years. Only 33 papers (23%) have been published after 2007, i.e., in the latest 9 years.

Papers in the three fields of cardiovascular medicine were distributed as follows: an overwhelming proportion, namely, 105 papers belonged to cardiology, 27 belonged to cardiovascular surgery, and 5 belonged to pediatric cardiology. In 20 shared articles, cardiologists collaborated with specialists in endocrinology, nephrology, biochemistry, dermatology, internal medicine, gynecology, oncology, hematology, public health, physical medicine, and pharmacology.

**Front-running institutions**

Only 33 medical institutions produced the 147 papers. Hacettepe Med Fac and Çerrahpaşa Med Fac were leading, each with 16 papers, and Gülhane Military Academy, Kartal Koşuyolu Res Hospital, Turkey’s Yüksek İhtisas Hospital, Erciyes U. and S. Demirel U. Med. faculties were runners-up with 7–10 papers (Table 2). Istanbul U. Istanbul, Ege U. and İnönü U. Med. faculties followed. Further, 23 institutions generated the remaining 45 publications. Eight hospitals not affiliated with academia contributed to 26 publications (18% of the total).

| Number of Papers | Institution Name                                      | City                     |
|------------------|-------------------------------------------------------|--------------------------|
| 16               | Hacettepe U. Med Fac., Ankara                         | Ankara                   |
| 16               | İ.U. Cerrahpaşa Med. Fac., İstanbul                   | İstanbul                 |
| 16               | Gülhane Military Medical Academy, Ank.                |                          |
| 10               | Kartal Koşuyolu Res. Hospital, İstanbul              | İstanbul                 |
| 8                | Turkey’s Yl Hosp., Ankara                            | Ankara                   |
| 8                | Sül. Demirel U. Med Fac., İsparta                    | Ankara                   |
| 8                | Erciyes U. Med Fac., Kayseri                         | Kayseri                  |
| 7,5              | İ.U. Istanbul Med. Fac.                              |                          |
| 7                | Ege U. Med Fac., Izmir                               | Izmir                    |
| 4,5              | İnönü U. Med Fac., Malatya                            | Malatya                  |
| 4                | Pamukkale U Med Fac., Denizli                         |                          |
| 4                | Başkent U. Med Fac., Ankara                           | Ankara                   |
| 3                | Harran U. Med Fac.                                   |                          |
| 3                | Mersin U. Med Fac.                                   |                          |
| 3                | Ankara U. Med Fac.                                   |                          |
| 3                | Kocaeli U. Med Fac.                                  |                          |
| 2,5              | S. Ersek Center for Cardiovasc. Surgery, Ist.        |                          |
| 3                | Gazi U. Med Fac., Ankara                             |                          |
| 2                | Cumhuriyet U. Med Fac.                               |                          |

| Total            | 147                                                   |                          |
Table 3. List of 18 primary authors with multiple publications, their total citations, institutions and periods of contribution

| Pap | Cites | Investigator | Institution | Period | Pap | Cites | Investigator | Institution | Period |
|-----|-------|--------------|-------------|--------|-----|-------|--------------|-------------|--------|
| 14  | 1387  | Altan Onat   | Cerrahpaşa  | 1992-'14| 3   | 159  | Şevket Ba Walton | GATA       | 2013-'14|
| 2   | 283   | Nihat Kalay  | Erciyes Ü   | 2006-'12| 3   | 152  | M Birhan Yılmaz | TYİH       | 2003-'08|
| 3   | 263   | Doğan Erdoğan| S Demirel    | 2006-'08| 2   | 154  | Necla Özer | Hacettepe  | 2000-'05|
| 3   | 233   | Mehmet Özaydın| S Demirel   | 2006-'08| 2   | 137  | Dursun Dursunoğlu | Pamukkale | 2005    |
| 3   | 231   | Mehmet Özkan | Koçyolu     | 1992-'13| 2   | 126  | L. Elif Sade | Hacettepe  | 2008-'09|
| 2   | 227   | İlknur Tarkun | Kocaeli U.  | 2004-'05| 2   | 126  | Meral Kayıkçıoğlu | Ege U.    | 2003-'09|
| 2   | 205   | Lale Tokgözoğlu | Hacettepe   | 1999   | 2   | 108  | Burak Pamuççu  | Çapa       | 2005-'06|
| 3   | 193   | Mehmet G. Kaya| Erciyes Ü   | 2002-'13| 2   | 107  | Yelda Başaran | Koçyolu    | 1996-'11|
| 3   | 180   | Hakan Turhan | İnönü       | 2004-'06| 2   | 100  | Mehmet Kaplan  | S. Ersek   | 2001-'02|
| 16  | 1467  |                |             |        | 55  | 4371 |              |            |        |

Discussion

What is the impact and its trend of “genuine” contribution of Turkey’s medical institutions to global knowledge on cardiovascular medicine in the past quarter century based on data retrieved from the Web of Science? This was assessed in this article. Publications representing internationally “collaborative” papers were excluded because it was recently shown that such papers, forming over two-thirds of our relatively highly-cited publications, diluted the actual performance capacity of the country (6).

The vast review by Adams (5) of publications from the Web of Science disclosed that domestic publications had flattened in the U.S. and Western Europe, and publication increases were due to international collaboration. In the U.S., papers with at least one author from another country in 2011 were found to be cited 1.36-fold more often than purely domestic research (5). Of note is that in clinical medicine (which excludes biochemistry, molecular biology, and neuroscience from overall medicine), following mean annual data were recorded in the Web of Science in the 10-year period from 2007 to 2016: 245,000 papers and 1.41 million citations in the world and 7400 papers and 19,150 citations in Turkey. It may be inferred that papers cited herein represent 2% of those generated in Turkey in cardiovascular medicine and that citations received by these papers make up 6% of those in clinical medicine) approximately one-third of those received by genuine papers in cardiovascular medicine in Turkey.

The selection of 50 citations as a threshold in this evaluation is highly comparable with that of 40 citations considered 2 years previously (8) because overall citations covered by the Web of Science increased by just over 24% in that short period.

The median exposure period is an important parameter to be taken into account because cumulative citations are strongly time-dependent. The 6 years from 2002 through 2007 comprised slightly more than one-half of the total publications, namely 86 publications, revealing that an annual mean of 14 papers were generated of this quality in cardiovascular medicine in Turkey. In view of the availability of 80 medical faculties plus the research hospitals of the Health Ministry, this performance falls short of what might be anticipated.

Estimating that the average number of top 12% of papers in cardiovascular medicine in the past decade is approximately 2500 per year, the generation of a mean of 10–12 papers per year in Turkey (in the first decade of this century) reflects an approximately global share of 4–5 per mille. In view of a declining trend thereafter, the performance is unsatisfactory with respect to the potential of Turkey.

Cardiovascular surgery and particularly, pediatric cardiology, have not kept up with the expectations. Papers in these two broad fields generated only 21% of high-quality papers in this period. Separate reasons for this deserve to be detected.

Overall performance compared with that 2 years previously

Data provided by Essential Science Indicators (9) inform us that in clinical medicine (which excludes biochemistry, molecular biology, and neuroscience from overall medicine), following mean annual data were recorded in the Web of Science in the 10-year period from 2007 to 2016: 245,000 papers and 1.41 million citations in the world and 7400 papers and 19,150 citations in Turkey. It may be inferred that papers cited herein represent 2% of those generated in Turkey in cardiovascular medicine and that citations received by these papers make up (6% of those in clinical medicine) approximately one-third of those received by genuine papers in cardiovascular medicine in Turkey.

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Institutions and researchers

It is to be noted that broadly, only one of the three medical faculties or major hospitals with cardiology departments suc-
ceeded in adding one publication to the current list in the 25 years. Hacettepe and Cerrahpaşa medical faculties, GATA and Kartal Koşuyolu Research Hospital, as well as Turkey’s Yüksek İhtisas Hospital, Erciyes and Süleyman Demirel university medical faculties merit special acknowledgment for having collectively generated just over half the quality research articles.

In the meantime, 19 papers (dating from 1999 to 2006) included in our analysis 2 years previously failed to attain the added 10 citations and are, thus, not included herein. Conversely, 22 articles have succeeded to be newly selected for this evaluation.

Eight papers appearing as late as 2013 and 2014 succeeded in meeting the high threshold of this study. Şevket Balta and Sait Demirkol, along with the dermatologist İlkınr Balt, produced three of the stated publications and thus, deserve tribute mention. M. Özkan, E. Hür, M.G. Kaya, N. Şen, and the current author were further actors of such a feat.

The exclusion of the period preceding 1992 precluded the inclusion of the following three scientists of the “old guard”: the cardiovascular surgeons Aydın Aytaç and İlhan Paşaoğlu and the pediatric cardiologist late Teoman Onat, each of whom merits tribute mention in this study. The current list of scientists welcomes, in particular, Mehmet G. Kaya and Nihat Kalay from Erciyes U, Şevket Balta and Sait Demirkol from GATA, and Mehmet Kaplan of the S. Ersek center. Mehmet Özkan and Doğan Erdoğan have strengthened their previous scientific base as did Selma Yazıcı and Yusuf Tavıl.

Cardiologists Birhan Yılmaz, Meral Kayıkçıoğlu, and Dursun Dursunoğlu and biochemist İlkınr Tarkun merit special mention for their stimulating work.

Periodicals mediating successful research

In particular, in this analysis, journals with relatively low impact factors, such as Coron Artery Dis, Angiology, or Eur J Cardiothorac Surg were also found to mediate in the success of 4–5 papers each. This implicates that well-designed and executed research may well be rewarded even when published in comparatively low-ranked journals.

Widening of the international gap in cardiologic research

Assessments of higher quality research in (cardiovascular) medicine in Turkey (9-11) have indicated stagnation. Moving increasingly away from competency in scientific issues, lower support by the government to academic institutions, and functional reorientation of state hospitals primarily as out-patient clinics seem to have reduced the attraction of thorough research. Joining consensus statements or international trials with few contributed cases, which attain high number of citations, do not conceal the lack of “highly-cited” genuine articles.

Conclusion

This evaluation of the “genuine” contribution of Turkey’s institutions to global knowledge in cardiovascular medicine resulted in the identification of 147 articles with 50–392 citations, received at a median of 12 years. I detected substantial attenuation in publications of this quality after 2007. Only 38 medical faculties and hospitals generated these papers, representing disappointing performance of a majority of related institutions.

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Peer-review: Externally peer-reviewed.

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