



Most cited 100 articles from Turkey on abdominal wall hernias: a bibliometric study

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ABSTRACT

Objective: The aim of the present study was to search the most-cited articles from Turkey on abdominal wall hernias and analyze their characteristics with several parameters.

Material and Methods: In March 2019, a search was conducted through all databases in the Web of Science (WoS) to determine the most-cited articles on abdominal wall hernias. Each article was evaluated in regard to host journal, year of publication, the complete list of authors, the type of article, main subject of the study, institution of the study group. Citation counts in Google Scholar (GSch) were also obtained.

Results: Mean number of citations of the top 100 articles in herniology was 30.50. Articles were published in 38 journals; Hernia is the leading host. No correlation was observed between the journal impact factors and the number of the citations. Two thirds of the articles were clinical studies. Article types had no significant effect on the citation counts. Inguinal hernia was the most frequent topic by taking place in 58 papers. Articles related to incisional hernias had a higher mean number of citations in comparison with other topics. Ankara University School of Medicine had most cited articles, the highest number of total citations, and the highest citation per articles. Ankara Numune Training and Research Hospital and Istanbul University School of Medicine had the highest number of the articles in the list.

Conclusion: Citation counts of hernia related articles from Turkey are relatively low. Hernia is the leading journal for Turkish studies. Inguinal hernia is the most frequent topic whereas papers about incisional hernias receive more citations than others.

Keywords: Hernia, abdominal wall, bibliometric, citation

INTRODUCTION

The number of publications from Turkey displays an obvious growth as biomedical publishing advances globally (1). However, recently Onat has performed a citation analysis and stated that Turkey's contribution to the medicine by scientific articles is not enough compared with the potential of the country (2). Citation (a reference to subsequent studies) in another paper is one of the criteria to value an article. Citation analysis of the publications in a specific subject is performed by bibliometric methodology. The earliest example was published in the *Journal of the American Medical Association* as one of the most-cited articles in the same journal in 1985 (3). In 2002, a study on 100 citation classics in general surgery journals was published (4). Mayir et al. have searched the most cited articles from Turkey in the general surgery field and revealed that hydatid disease, pilonidal sinus, breast diseases, and inguinal hernia were the most frequent subjects (5). Scientific papers on abdominal wall hernias also show a steady rise worldwide (6). Hernia repairs, especially those for inguinal hernias, can be performed in every institution, and the surgeons find opportunity to prepare scientific papers more easily in comparison with major operations in surgical practice.

The present study was done with the purpose of listing the most-cited articles from Turkey in the field of abdominal wall hernia and analyzing their characteristics with several parameters.

Cite this article as: Kulaçoğlu H, Celasin H. Most cited 100 articles from Turkey on abdominal wall hernias: a bibliometric study. Turk J Surg 2020; 36 (2): 180-191.

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Received: 23.05.2019

Accepted: 13.08.2019

Available Online Date: 08.06.2020

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DOI: 10.5578/turkjsurg.4536

MATERIAL and METHODS

Database Search

In March 2019, a search was conducted through all databases in the Web of Science (WoS) to determine the most-cited articles on abdominal wall hernias from Turkey. The keywords for the topic line of the search were “inguinal hernia,” “ventral hernia,” “incisional hernia,” “umbilical hernia,” “paraumbilical hernia,” and “femoral hernia.” Additionally, combinations of “hernia and emergency,” “hernia and mesh” were added. The keywords were searched in the titles, abstracts, and keywords given.

Data Recording

The study adhered to the Helsinki Declaration developed by the World Medical Association for medical research involving human material and data. After the top-cited 100 articles were determined and ranked by the number of citations, all full texts were reached. Each article was evaluated in regard to journal name, main field of the journal (surgery, general medicine, others), year of publication, the complete list of authors, number of authors, the type of article (clinical study; review/systematic review/meta-analysis/literature search; case report/case series; laboratory study/animal experiment/cadaver dissection), main subject of the study (inguinal, incisional, umbilical, femoral, etc; emergency; mesh and other materials—if the study focused on the characteristics or properties of prosthetic materials, or if several meshes were compared in repairing certain hernia types), institution of the study group. Citation counts in Google Scholar (GSch) were also obtained. The data were recorded in Office Excel 2016 (Microsoft, Redmond, WA).

Statistical Analysis

Data were exported to SPSS v.21 (IBM, Chicago, IL) for statistical analysis. A one-way ANOVA test was used to determine the differences between mean values. A correlation coefficient (r) was calculated to determine whether recorded parameters correlated with the citation counts of the listed articles. A p value less than 0.05 was accepted as significant.

RESULTS

The top 100 list of hernia related papers from Turkey is given in Table 1. The total number of citations of the top 100 articles in herniology was 3.050 in WoS (range: 12-145), and 5.672 in GSch (range: 16-272). Mean number of citations was 30.50 in WoS, and 56.72 in GSch.

The publication year was evaluated in 3 consecutive decades (Table 2). No article published before 1995 or earlier took place in the list. The most productive decade was 2000-2009, with 72 papers. The year with the highest number of articles in the list was 2006 (14 papers). The most recent paper in the list was published in 2014. No effect of the publication decade was observed on citation counts (Table 3).

One hundred top cited articles were published in 38 different journals: 80 papers in surgical journals and 20 papers in others (anesthesia, biomaterials, etc.). Hernia was the most frequent host journal with 23 articles (Table 4). Articles published in surgical journals had more citations than the ones in the journals from other disciplines (WoS: 32.85 vs. 21.10; $p=0.030$, and GSch: 60.70 vs. 40.80; $p=0.57$). No correlation was observed between the journal impact factors and the number of the citations. The number of the authors differed 1 to 11 with a mean number of 5.66; only 3 papers were written by one single author, and 2 by two authors. There was no correlation between the number of the authors and the citation counts. Interestingly, four papers had no authors from general surgery at all; two by anesthesiologists, one by radiologists, and another one by neurologists and urologist.

Two thirds of the articles were clinical studies. The types of the articles had no significant effect on citation counts (Table 5). Amongst the clinical studies, retrospective series had more citation counts than prospective studies (WoS: 44.38 vs. 27.76; $p=0.007$, and GSch: 85.43 vs. 51.47; $p=0.011$).

Inguinal hernia was the most frequent topic by taking place in 58 papers, incisional hernia was the second with 16 studies (Table 6). Twenty-one articles studied mesh materials. Six studies which investigated hernia repairs in emergency conditions had the highest mean citation number (WoS: 95.50; GSch: 177.50). Articles related to incisional hernias had a higher mean number of citations in comparison to ones about inguinal hernias (WoS: 38.73 vs. 28.12; $p=0.080$).

The top 100 articles originated from 43 institutions. There were 29 university hospitals, 10 teaching hospitals other than medical schools, 3 private hospitals and 1 rural public hospital. From another view, there were 39 publications from Ankara, 22 from Istanbul, 11 from Izmir and 28 from other cities. Ankara University School of Medicine had the most-cited article, the highest number of total citations, and the highest citation counts per articles. Ankara Numune Training and Research Hospital and Istanbul University School of Medicine had the highest number of the articles in the list (Table 7). On the other hand, no differences in citation counts were determined in comparison of university hospitals and other training hospitals.

DISCUSSION

Bibliometric analyses for citation counts in medical publishing have revealed that the most-cited articles were published between 1990 and 2010 (7-12). The most productive decade in the present study was 2000-2009. Even the most scientific articles need time to get citations by subsequent publications. Citation count lists are dynamic, and rankings may change by time, and we can see a rapid rise in the citation counts of papers produced in the last decade. Similarly, some articles that are not yet in the

Table 1. Top 100 list of papers with the highest citation counts

	Authors	Reference	WoS citations	GSch citations
1	Yerdel MA, Akin EB, Dolalan S, Turkcapar AG, Pehlivan M, Gecim IE, Kuterdem E.	Effect of single-dose prophylactic ampicillin and sulbactam on wound infection after tension-free inguinal hernia repair with polypropylene mesh: the randomized, double-blind, prospective trial. <i>Ann Surg.</i> 2001 Jan;233(1):26-33.	145	272
2	Kulah B, Kulacoglu IH, Oruc MT, Duzgun AP, Moran M, Ozmen MM, Coskun F.	Presentation and outcome of incarcerated external hernias in adults. <i>Am J Surg.</i> 2001 Feb;181(2):101-4.	104	203
3	Cingi A, Cakir T, Sever A, Aktan AO.	Enterostomy site hernias: a clinical and computerized tomographic evaluation. <i>Dis Colon Rectum.</i> 2006 Oct;49(10):1559-63.	91	141
4	Barbaros U, Asoglu O, Seven R, Erbil Y, Dincceg A, Deveci U, Ozarman S, Mercan S.	The comparison of laparoscopic and open ventral hernia repairs: a prospective randomized study. <i>Hernia.</i> 2007 Feb;11(1):51-6.	88	166
5	Kulah B, Duzgun AP, Moran M, Kulacoglu IH, Ozmen MM, Coskun F.	Emergency hernia repairs in elderly patients. <i>Am J Surg.</i> 2001 Nov;182(5):455-9.	83	152
6	Ozgün H, Kurt MN, Kurt I, Cevikel MH.	Comparison of local, spinal, and general anaesthesia for inguinal herniorrhaphy. <i>Eur J Surg.</i> 2002;168(8-9):455-9.	67	127
7	Bilsel Y, Abci I.	The search for ideal hernia repair: mesh materials and types. <i>Int J Surg.</i> 2012;10(6):317-21.	65	112
8	Geçim IE, Koçak S, Ersoz S, Bumin C, Arıbal D.	Recurrence after incisional hernia repair: results and risk factors. <i>Surg Today.</i> 1996;26(8):607-9.	65	104
9	Gurer A, Ozdogan M, Ozlem N, Yildirim A, Kulacoglu H, Aydin R.	Uncommon content in groin hernia sac. <i>Hernia.</i> 2006 Apr;10(2):152-5.	64	167
10	Kurt N, Oncel M, Ozkan Z, Bingul S.	Risk and outcome of bowel resection in patients with incarcerated groin hernias: retrospective study. <i>World J Surg.</i> 2003 Jun;27(6):741-3.	62	140
11	Uslu HY, Erkek AB, Cakmak A, Kepenekci I, Sozener U, Kocaay FA, Turkcapar AG, Kuterdem E.	Trocar site hernia after laparoscopic cholecystectomy. <i>J Laparoendosc Adv Surg Tech A.</i> 2007 Oct;17(5):600-3.	58	86
12	Basoglu M, Yildirgan M, Yilmaz I, Balik A, Celebi F, Atamanalp SS, Polat KY, Oren D.	Late complications of incisional hernias following prosthetic mesh repair. <i>Acta Chir Belg.</i> 2004 Aug;104(4):425-8.	55	104
13	Alptekin H, Yilmaz H, Acar F, Kafali ME, Sahin M.	Incisional hernia rate may increase after single-port cholecystectomy. <i>J Laparoendosc Adv Surg Tech A.</i> 2012 Oct;22(8):731-7.	53	78
14	Sen H, Sizlan A, Yanarateş O, Senol MG, Inangil G, Sücüllü I, Ozkan S, Dağlı G.	The effects of gabapentin on acute and chronic pain after inguinal herniorrhaphy. <i>Eur J Anaesthesiol.</i> 2009 Sep;26(9):772-6.	52	88
15	Avrtan L, Avci C, Bulut T, Fourtanier G.	Mesh infections after laparoscopic inguinal hernia repair. <i>Surg Laparosc Endosc.</i> 1997 Jun;7(3):192-5.	50	90
16	Demir S, Kepenekci I, Evrigen O, Birsen O, Tuzuner A, Karahuseyinoglu S, Ozban M, Kuterdem E.	The effect of polypropylene mesh on ilioinguinal nerve in open mesh repair of groin hernia. <i>J Surg Res.</i> 2006 Apr;131(2):175-81.	46	71
17	Demir U, Mihmanli M, Coskun H, Dilege E, Kalyoncu A, Altinli E, Gunduz B, Yilmaz B.	Comparison of prosthetic materials in incisional hernia repair. <i>Surg Today.</i> 2005;35(3):223-7.	46	73

Table 1. Top 100 list of papers with the highest citation counts (continue)

	Authors	Reference	WoS citations	Gsch citations
18	Berberoğlu M, Uz A, Ozmen MM, Bozkurt MC, Erkuran C, Taner S, Tekin A, Tekdemir I.	Corona mortis: an anatomic study in seven cadavers and an endoscopic study in 28 patients. <i>Surg Endosc.</i> 2001 Jan;15(1):72-5.	42	85
19	Atilla K, Guler S, Inal A, Sokmen S, Karademir S, Bora S.	Prosthetic repair of acutely incarcerated groin hernias: a prospective clinical observational cohort study. <i>Langenbecks Arch Surg.</i> 2010 Jun;395(5):563-8.	39	71
20	Derici H, Unalp HR, Bozdogan AD, Nazlı O, Tansug T, Kamer E.	Factors affecting morbidity and mortality in incarcerated abdominal wall hernias. <i>Hernia.</i> 2007 Aug;11(4):341-6.	38	74
21	Alimoglu O, Kaya B, Okan I, Dasiran F, Guzey D, Bas G, Sahin M.	Femoral hernia: a review of 83 cases. <i>Hernia.</i> 2006 Mar;10(1):70-3.	36	100
22	Aydede H, Erhan Y, Sakarya A, Kara E, Ilkgül O, Can M.	Effect of mesh and its localisation on testicular flow and spermatogenesis in patients with groin hernia. <i>Acta Chir Belg.</i> 2003 Nov-Dec;103(6):607-10.	36	59
23	Gönüllü NN, Cubukçu A, Alponat A.	Comparison of local and general anesthesia in tension-free (Lichtenstein) hernioplasty: a prospective randomized trial. <i>Hernia.</i> 2002 Mar;6(1):29-32.	35	91
24	Kulacoglu H.	Current options in inguinal hernia repair in adult patients. <i>Hippokratia.</i> 2011 Jul;15(3):223-31.	34	94
25	Kayaoglu HA, Ozkan N, Hazinedaroglu SM, Ersoy OF, Erkek AB, Koseoglu RD.	Comparison of adhesive properties of five different prosthetic materials used in hernioplasty. <i>J Invest Surg.</i> 2005 Mar-Apr;18(2):89-95.	34	52
26	Gürleyik E, Gürleyik G, Cetinkaya F, Unalmiser S.	The inflammatory response to open tension-free inguinal hernioplasty versus conventional repairs. <i>Am J Surg.</i> 1998 Mar;175(3):179-82.	34	47
27	Surgit O.	Single-incision Laparoscopic surgery for total extraperitoneal repair of inguinal hernias in 23 patients. <i>Surg Laparosc Endosc Percutan Tech.</i> 2010 Apr;20(2):114-8.	31	44
28	Cingi A, Solmaz A, Attaallah W, Aslan A, Aktan AO.	Enterostomy closure site hernias: a clinical and ultrasonographic evaluation. <i>Hernia.</i> 2008 Aug;12(4):401-5.	31	42
29	Andaç N, Baltacıoğlu F, Tüney D, Cımşit NC, Ekinçi G, Biren T.	Inguinoscrotal bladder herniation: is CT a useful tool in diagnosis? <i>Clin Imaging.</i> 2002 Sep-Oct;26(5):347-8.	31	67
30	Uzunköy A, Coskun A, Akinci OF, Kocyigit A.	Systemic stress responses after laparoscopic or open hernia repair. <i>Eur J Surg.</i> 2000 Jun;166(6):467-71.	31	53
31	Oruç MT, Akbulut Z, Ozozan O, Coşkun F.	Urological findings in inguinal hernias: a case report and review of the literature. <i>Hernia.</i> 2004 Feb;8(1):76-9.	29	83
32	Kapan S, Kapan M, Goksoy E, Karabıcak I, Oktar H.	Comparison of PTFE, pericardium bovine and fascia lata for repair of incisional hernia in rat model, experimental study. <i>Hernia.</i> 2003 Mar;7(1):39-43.	29	74
33	Dogru O, Girgin M, Bulbulcu N, Cetinkaya Z, Aygen E, Camci C.	Comparison of Kugel and Lichtenstein operations for inguinal hernia repair: results of a prospective randomized study. <i>World J Surg.</i> 2006 Mar;30(3):346-50.	28	61
34	Saygun O, Agalar C, Aydinuraz K, Agalar F, Daphan C, Saygun M, Ceken S, Akkus A, Denkbas EB.	Gold and gold-palladium coated polypropylene grafts in a S. epidermidis wound infection model. <i>J Surg Res.</i> 2006 Mar;131(1):73-9.	28	47

Table 1. Top 100 list of papers with the highest citation counts (continue)			WoS citations	GSch citations
Authors	Reference	Reference	WoS citations	GSch citations
35 Colak T, Akca T, Kanik A, Aydin S.	Randomized clinical trial comparing laparoscopic totally extraperitoneal approach with open mesh repair in inguinal hernia. <i>Surg Laparosc Endosc Percutan Tech.</i> 2003 Jun;13(3):191-5.	Randomized clinical trial comparing laparoscopic totally extraperitoneal approach with open mesh repair in inguinal hernia. <i>Surg Laparosc Endosc Percutan Tech.</i> 2003 Jun;13(3):191-5.	28	56
36 Türkçapar AG, Yerdel MA, Aydinuraz K, Bayar S, Kuterdem E.	Repair of midline incisional hernias using polypropylene grafts. <i>Surg Today.</i> 1998;28(1):59-63.	Repair of midline incisional hernias using polypropylene grafts. <i>Surg Today.</i> 1998;28(1):59-63.	28	58
37 Cakmak A, Cirpanli Y, Bilensoy E, Yorganci K, Calli S, Saribaş Z, Kaynaroğlu V.	Antibacterial activity of triclosan chitosan coated graft on hernia graft infection model. <i>Int J Pharm.</i> 2009 Nov 3;381(2):214-9.	Antibacterial activity of triclosan chitosan coated graft on hernia graft infection model. <i>Int J Pharm.</i> 2009 Nov 3;381(2):214-9.	27	47
38 Polat C, Dervisoglu A, Senyurek G, Bilgin M, Erzurumlu K, Ozkan K.	Umbilical hernia repair with the prolene hernia system. <i>Am J Surg.</i> 2005 Jul;190(1):61-4.	Umbilical hernia repair with the prolene hernia system. <i>Am J Surg.</i> 2005 Jul;190(1):61-4.	27	49
39 Karahasanoglu T, Onur E, Baca B, Hamzaoglu I, Pekmezci S, Boler DE, Kilic N, Altug T.	Spiral tacks may contribute to intra-abdominal adhesion formation. <i>Surg Today.</i> 2004;34(10):860-4.	Spiral tacks may contribute to intra-abdominal adhesion formation. <i>Surg Today.</i> 2004;34(10):860-4.	27	38
40 Akbulut G, Serteser M, Yücel A, Değirmenci B, Yilmaz S, Polat C, San O, Dilek ON.	Can laparoscopic hernia repair alter function and volume of testis? Randomized clinical trial. <i>Surg Laparosc Endosc Percutan Tech.</i> 2003 Dec;13(6):377-81.	Can laparoscopic hernia repair alter function and volume of testis? Randomized clinical trial. <i>Surg Laparosc Endosc Percutan Tech.</i> 2003 Dec;13(6):377-81.	27	45
41 Demirer S, Geçim IE, Aydinuraz K, Ataoğlu H, Yerdel MA, Kuterdem E.	Affinity of Staphylococcus epidermidis to various prosthetic graft materials. <i>J Surg Res.</i> 2001 Jul;99(1):70-4.	Affinity of Staphylococcus epidermidis to various prosthetic graft materials. <i>J Surg Res.</i> 2001 Jul;99(1):70-4.	27	35
42 Derci H, Unalp HR, Nazli O, Kamer E, Coskun M, Tansug T, Bozdog AD.	Prosthetic repair of incarcerated inguinal hernias: is it a reliable method? <i>Langenbecks Arch Surg.</i> 2010 Jun;395(5):575-9.	Prosthetic repair of incarcerated inguinal hernias: is it a reliable method? <i>Langenbecks Arch Surg.</i> 2010 Jun;395(5):575-9.	26	54
43 Celik A, Kutun S, Kockar C, Mengi N, Ulucanlar H, Cetin A.	Colonoscopic removal of inguinal hernia mesh: report of a case and literature review. <i>J Laparoendosc Adv Surg Tech A.</i> 2005 Aug;15(4):408-10.	Colonoscopic removal of inguinal hernia mesh: report of a case and literature review. <i>J Laparoendosc Adv Surg Tech A.</i> 2005 Aug;15(4):408-10.	26	38
44 Anadol ZA, Ersoy E, Taneri F, Tekin E.	Outcome and cost comparison of laparoscopic transabdominal preperitoneal hernia repair versus Open Lichtenstein technique. <i>J Laparoendosc Adv Surg Tech A.</i> 2004 Jun;14(3):159-63.	Outcome and cost comparison of laparoscopic transabdominal preperitoneal hernia repair versus Open Lichtenstein technique. <i>J Laparoendosc Adv Surg Tech A.</i> 2004 Jun;14(3):159-63.	26	48
45 Alimoglu O, Akcakaya A, Sahin M, Unlu Y, Ozkan OV, Sanli E, Er-yilmaz R.	Prevention of adhesion formations following repair of abdominal wall defects with prosthetic materials (an experimental study). <i>Hepatogastroenterology.</i> 2003 May-Jun;50(51):725-8.	Prevention of adhesion formations following repair of abdominal wall defects with prosthetic materials (an experimental study). <i>Hepatogastroenterology.</i> 2003 May-Jun;50(51):725-8.	26	37
46 Altuntas I, Tarhan O, Delibas N.	Septrafilm reduces adhesions to polypropylene mesh and increases peritoneal hydroxyproline. <i>Am Surg.</i> 2002 Sep;68(9):759-61.	Septrafilm reduces adhesions to polypropylene mesh and increases peritoneal hydroxyproline. <i>Am Surg.</i> 2002 Sep;68(9):759-61.	25	37
47 Gultekin FA, Kurukahvecioglu O, Karamercan A, Ege B, Ersoy E, Tatlicioglu E.	A prospective comparison of local and spinal anesthesia for inguinal hernia repair. <i>Hernia.</i> 2007 Apr;11(2):207.	A prospective comparison of local and spinal anesthesia for inguinal hernia repair. <i>Hernia.</i> 2007 Apr;11(2):207.	24	61
48 Dilek ON, YuceI A, Akbulut G, Degirmenci B.	Are there adverse effects of herniorrhaphy techniques on testicular perfusion? Evaluation by color Doppler ultrasonography. <i>Urol Int.</i> 2005;75(2):167-9.	Are there adverse effects of herniorrhaphy techniques on testicular perfusion? Evaluation by color Doppler ultrasonography. <i>Urol Int.</i> 2005;75(2):167-9.	24	38
49 Besim H, Yalçin Y, Hamamcı O, Arslan K, Sonişik M, Korkmaz A, Erdoğan S.	Prevention of intraabdominal adhesions produced by polypropylene mesh. <i>Eur Surg Res.</i> 2002 May-Jun;34(3):239-43.	Prevention of intraabdominal adhesions produced by polypropylene mesh. <i>Eur Surg Res.</i> 2002 May-Jun;34(3):239-43.	24	41
50 Gönüllü NN, Dülger M, Urkan NZ, Cantürk NZ, Alponat A.	Prevention of postherniorrhaphy urinary retention with prazosin. <i>Am Surg.</i> 1999 Jan;65(1):55-8.	Prevention of postherniorrhaphy urinary retention with prazosin. <i>Am Surg.</i> 1999 Jan;65(1):55-8.	24	49

Table 1. Top 100 list of papers with the highest citation counts (continue)

	Authors	Reference	WoS citations	Gsch citations
51	Aydinuraz K, Ağalar C, Ağalar F, Ceken S, Duruyürek N, Vural T.	In vitro S. epidermidis and S. aureus adherence to composite and lightweight polypropylene grafts. <i>J Surg Res.</i> 2009 Nov;157(1):e79-86.	23	39
52	Ersin S, Aydın U, Makay O, Icoz G, Tamsel S, Sozbilen M, Killi R.	Is testicular perfusion influenced during laparoscopic inguinal hernia surgery? <i>Surg Endosc.</i> 2006 Apr;20(4):685-9.	23	31
53	Dilge E, Coskun H, Gunduz B, Sakiz D, Mihmanli M.	Prevention of adhesion to prosthetic mesh in incisional ventral hernias: comparison of different barriers in an experimental model. <i>Eur Surg Res.</i> 2006;38(3):358-64.	23	28
54	Carilli S, Alper A, Emre A.	Inguinal cord lipomas. <i>Hernia.</i> 2004 Aug;8(3):252-4.	22	51
55	Vatansev C, Belviranlı M, Aksoy F, Tuncer S, Sahin M, Karahan O.	The effects of different hernia repair methods on postoperative pain medication and CRP levels. <i>Surg Laparosc Endosc Percutan Tech.</i> 2002 Aug;12(4):243-6.	22	38
56	Yavuz N, Ipek T, As A, Kapan M, Eyuboglu E, Erguney S.	Laparoscopic repair of ventral and incisional hernias: our experience in 150 patients. <i>J Laparosc Adv Surg Tech A.</i> 2005 Dec;15(6):601-5.	21	45
57	Baykal A, Yorganci K, Sokmensuer C, Hamaloglu E, Renda N, Sayek I.	An experimental study of the adhesive potential of different meshes. <i>Eur J Surg.</i> 2000 Jun;166(6):490-4.	21	28
58	Koç M, Tez M, Yoldaş O, Dizen H, Göçmen E.	Cooling for the reduction of postoperative pain: prospective randomized study. <i>Hernia.</i> 2006 Apr;10(2):184-6.	20	47
59	Cihan A, Ozdemir H, Uçan BH, Acun Z, Comert M, Tascilar O, Cesur A, Cakmak GK, Gundogdu S.	Fade or fate. Seroma in laparoscopic inguinal hernia repair. <i>Surg Endosc.</i> 2006 Feb;20(2):325-8.	20	33
60	Ozdogan M, Yildiz F, Gurer A, Orhun S, Kulacoglu H, Aydin R.	Changes in collagen and elastic fiber contents of the skin, rectus sheath, transversalis fascia and peritoneum in primary inguinal hernia patients. <i>Bratisl Lek Listy.</i> 2006;107(6-7):235-8.	20	41
61	Gokalp A, Inal M, Maralcan G, Baskonus I.	A prospective randomized study of Lichtenstein open tension-free versus laparoscopic totally extraperitoneal techniques for inguinal hernia repair. <i>Acta Chir Belg.</i> 2003 Oct;103(5):502-6.	20	44
62	Polat C, Kahraman A, Yilmaz S, Koken T, Serteser M, Akbulut G, Arkan Y, Dilek ON, Gokce O.	A comparison of the oxidative stress response and antioxidant capacity of open and laparoscopic hernia repairs. <i>J Laparosc Adv Surg Tech A.</i> 2003 Jun;13(3):167-73.	20	27
63	Salman AE, Yetişir F, Yürekli B, Aksoy M, Yıldırım M, Kiliç M.	The efficacy of the semi-blind approach of transversus abdominis plane block on postoperative analgesia in patients undergoing inguinal hernia repair: a prospective randomized double-blind study. <i>Local Reg Anesth.</i> 2013 Jan 18;6:1-7.	19	27
64	Anadol AZ, Akin M, Kurukahvecioglu O, Tezel E, Ersoy E.	A prospective comparative study of the efficacy of conventional Lichtenstein versus self-adhesive mesh repair for inguinal hernia. <i>Surg Today.</i> 2011 Nov;41(11):1498-503.	19	29
65	Karakayali F, Oksuz E, Turk E, Pekmez M, Karabulut Z, Yilmaz T, Moray G, Haberal M.	Effectiveness of multiple neurectomies to prevent chronic groin pain after tension-free hernia repair. <i>Int Surg.</i> 2010 Jan-Mar;95(1):40-8.	19	32
66	Kamer E, Unalp HR, Derici H, Tansug T, Onal MA.	Laparoscopic cholecystectomy accompanied by simultaneous umbilical hernia repair: a retrospective study. <i>J Postgrad Med.</i> 2007 Jul-Sep;53(3):176-80.	19	35

Table 1. Top 100 list of papers with the highest citation counts (continue)			
	Authors	Reference	GSch citations
67	Eryilmaz R, Sahin M, Tekelioğlu MH.	Which repair in umbilical hernia of adults: primary or mesh? <i>Int Surg.</i> 2006 Sep;91(5):258-61.	19
68	Terzi C.	Antimicrobial prophylaxis in clean surgery with special focus on inguinal hernia repair with mesh. <i>J Hosp Infect.</i> 2006 Apr;62(4):427-36.	19
69	Abci I, Bilgi S, Altan A.	Role of TIMP-2 in fascia transversalis on development of inguinal hernias. <i>J Invest Surg.</i> 2005 May-Jun;18(3):123-8.	19
70	Ozden I, Emre A, Bilge O, Tekant Y, Acarlı K, Alper A, Arıyogul O.	Elective repair of abdominal wall hernias in decompensated cirrhosis. <i>Hepatogastroenterology.</i> 1998;45(23):1516-1518.	19
71	Günel O, Ozer S, Gürleyik E, Bağcıbaşı T.	Does the approach to the groin make a difference in hernia repair? <i>Hernia.</i> 2007 Oct;11(5):429-34.	18
72	Yelimliş B, Alponat A, Cubukçu A, Kuru M, Öz S, Erçin C, Gönüllü N.	Carboxymethylcellulose coated on visceral face of polypropylene mesh prevents adhesion without impairing wound healing in incisional hernia model in rats. <i>Hernia.</i> 2003 Sep;7(3):130-3.	18
73	Kama NA, Coskun T, Yavuz H, Doganay M, Reis E, Akat AZ.	Autologous skin graft, human dura mater and polypropylene mesh for the repair of ventral abdominal hernias: an experimental study. <i>Eur J Surg.</i> 1999 Nov;165(11):1080-5.	18
74	Yilmazlar T, Kızıl A, Zorluoğlu A, Özgüç H.	The value of hemiography in football players with obscure groin pain. <i>Acta Chir Belg.</i> 1996 Jun;96(3):115-8.	18
75	Ergül Z, Akinci M, Ugurlu C, Kulacoglu H, Yılmaz KB.	Prophylactic antibiotic use in elective inguinal hernioplasty in a trauma center. <i>Hernia.</i> 2012 Apr;16(2):145-51.	17
76	Kulacoglu H, Yazıcıoğlu D, Özyaylılı I.	Prosthetic repair of umbilical hernias in adults with local anesthesia in a day-case setting: a comprehensive report from a specialized hernia center. <i>Hernia.</i> 2012 Apr;16(2):163-70.	17
77	Sucullu I, Filiz AI, Sen B, Özdemir Y, Yucel E, Sinan H, Sen H, Dandın O, Kurt Y, Gulec B, Özyurt M.	The effects of inguinal hernia repair on testicular function in young adults: a prospective randomized study. <i>Hernia.</i> 2010 Apr;14(2):165-9.	17
78	Malazgirt Z, Topgul K, Sokmen S, Ersin S, Turkcapar AG, Gok H, Gonullu N, Paksoy M, Ertem M.	Spigelian hernias: a prospective analysis of baseline parameters and surgical outcome of 34 consecutive patients. <i>Hernia.</i> 2006 Aug;10(4):326-30.	17
79	Terzi C, Kiliç D, Unek T, Hoşgörler F, Füzün M, Ergör G.	Single-dose oral ciprofloxacin compared with single-dose intravenous cefazolin for prophylaxis in inguinal hernia repair: a controlled randomized clinical study. <i>J Hosp Infect.</i> 2005 Aug;60(4):340-7.	17
80	Kuzu MA, Hazinedaroğlu S, Dolalan S, Özkan N, Yalçın S, Erkek AB, Mahmoudi H, Tüzüner A, Elhan AH, Kuterdem E.	Prevention of surgical site infection after open prosthetic inguinal hernia repair: efficacy of parenteral versus oral prophylaxis with amoxicillin-clavulanic acid in a randomized clinical trial. <i>World J Surg.</i> 2005 Jun;29(6):794-9.	17
81	Akcaboy EY, Akcaboy ZN, Gogus N.	Ambulatory inguinal herniorrhaphy: paravertebral block versus spinal anesthesia. <i>Minerva Anesthesiol.</i> 2009 Dec;75(12):684-91.	16
82	Erhan Y, Erhan E, Aydede H, Mercan M, Tok D.	Chronic pain after Lichtenstein and preperitoneal (posterior) hernia repair. <i>Can J Surg.</i> 2008 Oct;51(5):383-7.	16

Table 1. Top 100 list of papers with the highest citation counts (continue)

Authors	Reference	WoS citations	GSch citations
83 Astarcioglu H, Sökmen S, Atila K, Karademir S.	Incarcerated inferior lumbar (Petit's) hernia. <i>Hernia</i> . 2003 Sep;7(3):158-60.	16	37
84 Onal A, Sökmen S, Atila K.	Spigelian hernia associated with strangulation of the small bowel and appendix. <i>Hernia</i> . 2003 Sep;7(3):156-7.	16	20
85 Ozmen MM, Aslar AK, Terzi MC, Albayrak L, Berberoğlu M.	Prevention of adhesions by bioresorbable tissue barrier following laparoscopic intraabdominal mesh insertion. <i>Surg Laparosc Endosc Percutan Tech</i> . 2002 Oct;12(5):342-6.	16	22
86 Demirci A, Efe EM, Türker G, Gurbet A, Kaya FN, Anil A, Cimen I.	[Iliohypogastric/ilioinguinal nerve block in inguinal hernia repair for postoperative pain management: comparison of the anatomical landmark and ultrasound guided techniques]. <i>Rev Bras Anesthesiol</i> . 2014 Sep-Oct;64(5):350-6.	15	30
87 Akyol C, Kocaay F, Orozakunov E, Genc V, Kepenekci Bayram I, Cakmak A, Baskan S, Kuterdem E.	Outcome of the patients with chronic mesh infection following open inguinal hernia repair. <i>J Korean Surg Soc</i> . 2013 May;84(5):287-91. doi:10.4174/jkss.2013.84.5.287.	15	27
88 Caliskan K, Nursal TZ, Caliskan E, Parlakgumus A, Yildirim S, Nonyan T.	A method for the reduction of chronic pain after tension-free repair of inguinal hernia: iliohypogastric neurectomy and subcutaneous transposition of the spermatic cord. <i>Hernia</i> . 2010 Feb;14(1):51-5.	15	27
89 Kurukahvecioglu O, Ege B, Yazicioglu O, Tezel E, Ersoy E.	Polytetrafluoroethylene prosthesis migration into the bladder after laparoscopic hernia repair: a case report. <i>Surg Laparosc Endosc Percutan Tech</i> . 2007 Oct;17(5):474-6.	15	34
90 Bademkiran F, Tataroglu C, Ozdedeli K, Altay B, Aydogdu I, Uluoglu B, Ertekin C.	Electrophysiological evaluation of the genitofemoral nerve in patients with inguinal hernia. <i>Muscle Nerve</i> . 2005 Nov;32(5):600-4.	15	21
91 Ipek T, Eyuboglu E, Aydingoz O.	Laparoscopic management of inferior lumbar hernia (Petit triangle hernia). <i>Hernia</i> . 2005 May;9(2):184-7.	15	30
92 Yilmaz I, Karakas DO, Sucullu I, Ozdemir Y, Yucel E.	A rare cause of mechanical bowel obstruction: mesh migration. <i>Hernia</i> . 2013 Apr;17(2):267-9.	14	25
93 Seker D, Kulacoglu H.	Long-term complications of mesh repairs for abdominal-wall hernias. <i>J Long Term Eff Med Implants</i> . 2011;21(3):205-18.	14	36
94 Dilege E, Deveci U, Erbil Y, Dinççağ A, Seven R, Ozarmagan S, Mercan S, Barbaros U.	N-butyl cyanoacrylate versus conventional suturing for fixation of meshes in an incisional hernia model. <i>J Invest Surg</i> . 2010 Oct;23(5):262-6.	14	24
95 Piskin T, Aydin C, Barut B, Dirican A, Kayaalp C.	Preoperative progressive pneumoperitoneum for giant inguinal hernias. <i>Ann Saudi Med</i> . 2010 Jul-Aug;30(4):317-20.	14	29
96 Ozkan D, Akkaya T, Cömert A, Balıkcı N, Özdemir E, Gümtüs H, Ergül Z, Kaya O.	Paravertebral block in inguinal hernia surgeries: two segments or 4 segments? <i>Reg Anesth Pain Med</i> . 2009 Jul-Aug;34(4):312-5.	14	29
97 Kulacoglu H, Ozdogan M, Gurer A, Ersoy EP, Onder Devay A, Duygulu Devay S, Gulbahar O, Gogkus S.	Prospective comparison of local, spinal, and general types of anaesthesia regarding oxidative stress following Lichtenstein hernia repair. <i>Bratisl Lek Listy</i> . 2007;108(8):335-9.	14	32
98 Hengirmen S, Cete M, Soran A, Aksoy F, Sencer H, Olcay E.	Comparison of meshes for the repair of experimental abdominal wall defects. <i>J Invest Surg</i> . 1998 Sep-Oct;11(5):315-25.	14	33
99 Ramadan SU, Gokharman D, Tuncbilek I, Ozer H, Kosar P, Kacar M, Temel S, Kosar U.	Does the presence of a mesh have an effect on the testicular blood flow after surgical repair of indirect inguinal hernia? <i>J Clin Ultrasound</i> . 2009 Feb;37(2):78-81.	13	16
100 Yavuz N, Ersoy YE, Demirkesen O, Tortum OB, Erguney S.	Laparoscopic incisional lumbar hernia repair. <i>Hernia</i> . 2009 Jun;13(3):281-6.	12	27

WoS: Web of Science, GSch: Google Scholar.

Table 2. Number of articles regarding journal type and decade of publication

Decade	Surgery	Others	Total
1990-1999	8	1	9
2000-2009	58	14	72
2010-2019	14	5	19
Total	80	20	100

Table 3. Mean citations counts of top 100 papers regarding decade of publication

Decade	No of papers	WoS citations	GSch citations
1990-1999	9	30.00 (270)	53.1 (478)
2000-2009	72	32.26 (2,323)	60.69 (4,370)
2010-2019	19	24.05 (457)	43.37 (824)
p		0.35	0.27

The figures in parenthesis are total numbers within the decade.

Table 4. Leading journals in the "Top 100 List" in herniology

Journal name	No of papers
Hernia	23
Journal of Laparoendoscopic Advanced Surgical Techniques and Videoscopy	6
Surgical Laparoscopy Endoscopy & Percutaneous Techniques	6
Journal of Surgical Research	5
Surgery Today	5
Acta Chirurgica Belgica	4
American Journal of Surgery	4
European Journal of Surgery	4
Journal of Investigative Surgery	4
World Journal of Surgery	3
Surgical Endoscopy	3

Table 5. Citation counts regarding type of article

Study type	No of papers	WoS citations	GSch citations
Clinical study	66	33.05	62.27
Review	4	33.00	72.00
Case report or case series	10	20.90	39.70
Laboratory studies, animal experiments, cadaver study	20	26.40	43.85
p		0.310	0.156

Table 6. Topics of the article

Inguinal hernia	58
Incisional hernia	16
Umbilical hernia	5
Femoral hernia	1
Spigelian hernia	2
Lumbar hernia	2
Emergency repairs	6
Mesh	21
Fixing material	2
Infection	11
Some articles focused on multiple topics.	

Table 7. Most influential authors with more than 200 citations in total in the "Top 100 List" in herniology

Institution	Total number of citations	Total number of articles	Citation per article	Highest citation count for an article
Ankara University School of Medicine	401	8	50.13	145
Ankara Numune Teaching Hospital	366	10	36.60	104
İstanbul University School of Medicine	366	10	36.60	91
Ankara Atatürk Teaching Hospital	117	4	29.25	64
9 Eylül University	107	5	21.40	39
Gazi University School of Medicine	84	4	21.00	26
İzmir Atatürk Teaching Hospital	83	3	27.67	38
Dışkapı Yıldırım Beyazıt Teaching Hospital	79	4	19.75	34
Kocaeli University School of Medicine	77	3	25.67	35

top 100 list can also enter the list in, and there may be changes in the ranking of some papers already on the list. Also, the citation and publication numbers of the authors in top 100 lists may not thoroughly reflect their overall productivity in those fields.

van Noorden et al. have reported that 43.8% of all scientific publications have collected no citations at all, and 1.84% of all stay in the citation band of 100-999 citations (13). Amongst articles in herniology from Turkey, only two papers have passed the 100 citations threshold, and other 13 papers have collected more than 50 citations. Mean number of citations in WoS is only 30. In 2002, Paladugu et al. have reported that the mean citation number of the 100 citation classics in general surgery journals is 405 (4). There was no article on abdominal wall hernias in that top 100 list. A very recent bibliometric study in general surgery has found a median number of 490 citations within the 5 journals with the highest impact factor (14). On the other hand, Mayir et al. have reported that 7.7% of the most cited articles in general surgery from Turkey was on inguinal hernias (5). Onat

has detected 6 papers from general surgery field in a list of 271 articles for Turkey's contribution to medicine, and only one of those was related to the abdominal wall hernias (2). That paper was produced by the Surgical Department of Ankara University School of Medicine (15). Its citation count had been 76 that time and was found to reach 145 in the present search.

The top 100 articles in the herniology field were produced by 43 institutions. Five of the 10 most productive institutions were complied with Nayir et al.'s list for general surgery publications from Turkey (5). Moreover, the most productive city was Ankara in both studies, and non-academic teaching hospitals exhibited as great success as university hospitals did. This difference probably originated from the nature of the hernia surgery, which is suitable for almost all surgical facilities. On the contrary, vast majority of the publications on more complex surgical procedures like transplantation is produced by university hospitals (16). Onat's study on citation counts of Turkish papers from all disciplines revealed a different picture, 90% of the medical publications in that list were produced by university hospitals (2). A

bibliometric study for orthopedic publications originating from Turkey concordantly revealed that only one out of the most productive 10 institutions was non-academic teaching hospital (17); it was Ankara Numune Training and Research Hospital, which is also in the second rank in the present study.

The 100 top-cited papers were published in 38 journals. This figure ranges between 10 and 46 in previous publications on citation analyses in different fields (7-9,18,19). Top 100 papers in general surgery was published in only 10 surgical journals (4). In the present study, 80 articles were published in surgical journals, and these articles collected more citations than those in the journals from other disciplines. As a specific journal in this field, *Hernia* journal receives a large number of submissions related to abdominal wall hernias. It is clearly the top journal in the present study. Unfortunately, no single article published in a journal from Turkey entered the top 100 list.

Journal impact factor is a reflection of the average number of citations to recent articles published in journals. A positive correlation between the journal impact factor and the citation counts is an expected finding. Accordingly, some studies have shown that journal impact factors are strong predictors for citation counts (7,11,12,19,20). However, no correlation was detected between the journal impact factors and the number of the citations in the present study.

Clinical studies are the most frequent article types in the previous bibliometric analyses for citation counts (10,11,18). Unlike, in a bibliometric study on hepatocellular carcinoma articles revealed that review articles collected higher mean number of citations than that for other types (18). In the present study, clinical studies and review articles received more citations than case reports and laboratory studies; however, the difference was not significant. Retrospective clinical series collected more citation counts than prospective studies, possibly because of their larger number of patients from the archives of tertiary reference hospitals than prospective randomized studies with small number of subjects.

Classification of the articles in the top 100 list regarding the topic of the study revealed interesting results. The number of papers on inguinal hernias were more than three times of those about incisional hernias. This is somewhat expected given the fact that inguinal hernia repairs comprise the majority of operations for abdominal wall hernias (21,22). However, incisional hernia articles had a higher mean number of citations than papers on inguinal hernias. On the other side, the total number in the list and the mean citation counts for papers about umbilical hernias are lower than those for incisional hernias despite the fact that the share of these two types of hernias within surgical repairs are quite similar. One reason for this situation may be the complexity in repair of incisional hernias together with more frequent and more serious complications following them.

CONCLUSION

Citation counts of hernia related articles from Turkey are relatively low. *Hernia* is the leading journal for Turkish studies. Inguinal hernia is the most frequent topic, whereas papers about incisional hernias receive more citations than others.

Ethics Committee Approval: Not relevant.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept – H.K.; Design – H.K.; Supervision – H.K.; Data Collection and/or Processing – H.K., H.C.; Analysis and Interpretation – H.K.; Literature Search – H.C.; Writing Manuscript – H.K.; Critical Reviews – H.K., H.C.

Conflict of Interest: The authors have no conflicts of interest to declare.

Financial Disclosure: The authors declared that this study has received no financial support.

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ORJİNAL ÇALIŞMA-ÖZET

Turk J Surg 2020; 36 (2): 180-191

Türkiye'den yayınlanan karın duvarı fıtıkları ile ilgili bilimsel makaleler içinde en çok atıf alan 100 makale: bibliyometrik çalışma

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ÖZET

Giriş ve Amaç: Bu çalışmanın amacı, Türkiye'den karın duvarı fıtıkları ile ilgili yayınlanan makaleler içinde en çok atıf alan 100 yazıyı bulmak ve değerlendirmektir.

Gereç ve Yöntem: Mart 2019 tarihinde Web of Science veri tabanında yapılan tarama ile en çok atıf alan 100 makale belirlendi. Bu makaleler yayımlandıkları dergilere, yayın tarihine, yazarlarına, makale türüne, makalenin odaklandığı konuya ve yayını yapan merkeze göre analiz edildi. Tüm makalelerin Google Scholar'daki atıf sayıları da kaydedildi.

Bulgular: Listedeki 100 makalenin ortalama atıf sayısı 30,50 idi. Makaleler 38 ayrı dergide yayımlanmıştı, en çok makale *Hernia* dergisinde yer almıştır. Dergilerin etki faktörü ile atıf sayısı arasında ilişki saptanmamıştır. Yazıların 2/3'ü klinik çalışmalardır. Makale türünün atıf sayısı üzerine etkisi yoktu. Kasık fıtıkları 58 makale ile en sık incelenen konuydu. Kesi fıtıkları ile ilgili yayınlar diğer konulara göre daha fazla ortalama atıf sayısına sahipti. En yüksek atıf alan makalenin yayımlandığı Ankara Üniversitesi Tıp Fakültesi aynı zamanda listedeki yayınlar dahilinde en yüksek toplam atıf sayısına ve makale başına en yüksek atıf sayısına sahip merkezdi. Ankara Numune Eğitim ve Araştırma Hastanesi ve İstanbul Üniversitesi Tıp Fakültesi listeye en yüksek sayıda makale veren kurumlardı.

Sonuç: Fıtıklarla ilgili Türk makaleleri nispeten düşük atıf sayılarına sahipti. En çok makalenin yayınladığı dergi *Hernia* idi. Kasık fıtıkları çalışmaları da en çok incelenen konuydu, ancak kesi fıtıkları ile ilgili yazıların ortalama atıf sayısı daha yüksekti.

Anahtar Kelimeler: Fıtık, karın duvarı, bibliyometrik, atıf

DOI: 10.5578/turksurg.4536