Study of Highly Cited Papers on Antineoplastic Drugs

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Abstract. The objective of this paper is to study the highly cited papers (papers cited more than 30 times) on antineoplastic drugs, and to provide reference for quality improvement and influence increase of journals. Bibliometric analysis of cited papers on antineoplastic drugs published between 1999 and 2018 is conducted by using the Chinese Citation Database. The results show that 4683 papers are cited 34463 times, with an average of 7.36 times per paper. The papers published in 2005, 2010 and 2009 are the most highly cited papers with 2507 (7.27%), 2424 (7.03%) and 2419 (7.02%) times, respectively. The highest number of citation is owned by the paper authored by Ding Jian which is cited 349 (1.01%) times. The most cited journal is Chinese Journal of New Drugs, which is cited 1287 (3.73%) times. The author’s affiliation with the highest citation is China Pharmaceutical University with a citation of 1252 (3.63%) times. The research fund with the highest citation which funded those studies is National Natural Science Foundation of China with a citation of 4278 (12.41%) times. The most highly cited subject is pharmacy with a citation of 12036 (34.92%) times. The main citation period of the top 20 papers is from the 2nd year to the 9th year after publication, accounting for 67.70%. The peak years of citation are the 4th year and the 5th year after publication. Among the above-mentioned top 20 papers, the first authors of 9 papers are from universities, accounting for 45.00%. There are 210 papers with a citation over 30 times for each paper, including 112 (53.33%) research papers and 98 (46.67%) review papers. The study also shows that the subjects of research papers with high citation include pharmacological experimental research, the evaluation of clinical effects, and the impact and protection of antineoplastic drugs, the number of cited papers of which are 50, 18 and 13, accounting for 23.81%, 8.57% and 6.19%, respectively. The papers with high citation frequency are those about antineoplastic drugs in pharmacological effects and mechanisms, clinical evaluation, occupational protection, adverse reactions, as well as various reviews. Editors of journal should focus to organize and absorb above ideas in selecting manuscripts to fully exploit the excellent manuscript sources, and to improve the quality and influence of journals.

1. Introduction

The value of research papers lies in the inheritance and innovation of scientific research. The higher the citation frequency of the paper, the greater value of the scientific research results is. Thus, the
method of evaluating the quality of papers by citation frequency has received extensive attention. Frequently cited papers refer to the papers with relatively high citation frequency and long citation period. Frequently cited papers are valuable and important in scientific research and represent a high academic level [1]. For authors, frequently cited papers are of great academic importance. For journals, frequently cited papers indicate their high quality and level, which is also the main contribution to journal citation indicators [2]. The more the papers are cited, the greater contribution to the total citation frequency of the journal and vice versa. Study on frequently cited papers has a positive effect on appointment of manuscript, quality improvement, and enhancement of the journal’s academic influence. Thus frequently cited papers have received attention from researchers [3-10].

Tumor is a disease with a high mortality rate that seriously threatens human health. Drug therapy has certain curative effect on tumors. There is analysis on citations of doctoral dissertations on oncology [11]. The pharmacological effects [12-13], clinical evaluation [14-15] and review of antineoplastic drugs [16-18] have received extensive attention. This study conducts analysis of highly cited papers on antineoplastic drugs published between 1999 and 2018 by using bibliometric method.

2. Data Source and Methodology
The data is retrieved from Chinese Citation Database in China National Knowledge Infrastructure (CNKI) [19]. Using antineoplastic drugs as the searching key word, the cited papers in the field of antineoplastic drug research between 1999 and 2018 are collected on Jan. 11th 2019. By using the bibliometric method, we analyze the publication period of all the collected papers, the top 10 cited authors, the top 10 cited affiliations, the top 10 cited journals, the top 10 cited funds and the top 10 cited subjects. We also analyze the cited period of the top 20 papers and the research areas of the papers cited more than 30 times. Through the descriptive analysis of the cited papers on antineoplastic drugs, the basic characteristics are obtained, which indicates the direction for the journal editors' drafts organization and reservation.

3. Result and Analysis

3.1. Analysis of Cited Times Versus Date of Publication

| Number | Publication period | Number of papers | Percentage of number of papers | Citation frequency | Percentage of Citation frequency |
|--------|-------------------|-----------------|-------------------------------|-------------------|----------------------------------|
| 1      | 2005              | 238             | 5.08%                         | 2507              | 7.27%                            |
| 2      | 2010              | 344             | 7.35%                         | 2424              | 7.03%                            |
| 3      | 2009              | 315             | 6.73%                         | 2419              | 7.02%                            |
| 4      | 2008              | 270             | 5.77%                         | 2305              | 6.69%                            |
| 5      | 2007              | 267             | 5.70%                         | 2144              | 6.22%                            |
| 6      | 2006              | 241             | 5.15%                         | 2103              | 6.10%                            |
| 7      | 2004              | 183             | 3.91%                         | 2070              | 6.01%                            |
| 8      | 2011              | 307             | 6.56%                         | 2026              | 5.88%                            |
| 9      | 2013              | 356             | 7.60%                         | 2026              | 5.88%                            |
| 10     | 2002              | 142             | 3.03%                         | 1936              | 5.62%                            |
| 11     | 2000              | 115             | 2.46%                         | 1908              | 5.54%                            |
| 12     | 2012              | 357             | 7.62%                         | 1888              | 5.48%                            |
| 13     | 2001              | 119             | 2.54%                         | 1765              | 5.12%                            |
| 14     | 2003              | 152             | 3.25%                         | 1624              | 4.71%                            |
| 15     | 2014              | 356             | 7.60%                         | 1598              | 4.64%                            |
| 16     | 2015              | 346             | 7.39%                         | 1340              | 3.89%                            |
| 17     | 1999              | 98              | 2.09%                         | 996               | 2.89%                            |
| 18     | 2016              | 268             | 5.72%                         | 937               | 2.72%                            |
| 19     | 2017              | 188             | 4.01%                         | 414               | 1.20%                            |
| 20     | 2018              | 21              | 0.45%                         | 33                | 0.10%                            |
| Total  |                   | 4683            | 100%                          | 34463             | 100%                             |
A total of 4683 cited papers on antineoplastic drugs are retrieved, which are cited 34463 times, with an average of 7.36 times per paper (see Table 1). The citation frequency is the highest for papers published in 2005, 2010 and 2009, which are 2507 (7.27%), 2424 (7.03%) and 2419 (7.02%), respectively. The number of cited papers for the publication year of 2012, 2013 and 2014 is relatively high, which is 357 (7.62%), 356 (7.60%) and 356 (7.60%), respectively.

3.2. Analysis of the Authors of the Cited Papers
The authors of the top 10 cited papers on antineoplastic drugs are listed in Table 2. The top 3 authors are Ding Jian from the Shanghai Institute of Materia Medica, Chinese Academy of Sciences, You Qidong from China Pharmaceutical University, and Zhou Youjun from the Second Military Medical University. They are cited 349, 282 and 217 times, accounting for 1.01%, 0.82% and 0.63%, respectively.

3.3. Analysis of Journals of the Cited Papers
The top 10 journals of cited papers on antineoplastic drugs are shown in Table 3. Chinese New Drugs Journal, Chinese Journal of Cancer Prevention and Treatment, and Acta Pharmaceutica Sinica are cited for 1287, 1284, 850 times, accounting for 3.73%, 3.73% and 2.47%, respectively.

### Table 2. Authors of the top 10 cited antineoplastic drug papers

| Number | Cited author          | Number of papers | Percentage of number of papers | Citation frequency | Percentage of citation frequency |
|--------|-----------------------|------------------|--------------------------------|--------------------|----------------------------------|
| 1      | Ding Jian             | 12               | 0.26%                          | 349                | 1.01%                            |
| 2      | You Qidong            | 26               | 0.56%                          | 282                | 0.82%                            |
| 3      | Zhou Youjun           | 13               | 0.28%                          | 217                | 0.63%                            |
| 4      | Chen Kaoshan          | 2                | 0.04%                          | 197                | 0.57%                            |
| 5      | Zhu Ju                | 15               | 0.32%                          | 192                | 0.56%                            |
| 6      | Lin Jun               | 1                | 0.02%                          | 191                | 0.55%                            |
| 7      | Cui Jingrong          | 6                | 0.13%                          | 185                | 0.54%                            |
| 8      | Zhen Yongsu           | 11               | 0.23%                          | 177                | 0.51%                            |
| 9      | Zhang Wannian         | 15               | 0.32%                          | 174                | 0.50%                            |
| 10     | Li Wuping             | 6                | 0.13%                          | 165                | 0.48%                            |
| Total  |                      | 107              | 2.29%                          | 2129               | 6.17%                            |

### Table 3. Top 10 journals of cited papers on antineoplastic drugs

| Number | Cited journals                              | Number of papers | Percentage of number of papers | Citation frequency | Percentage of citation frequency |
|--------|--------------------------------------------|------------------|--------------------------------|--------------------|----------------------------------|
| 1      | Chinese New Drugs Journal                  | 117              | 2.50%                          | 1287               | 3.73%                            |
| 2      | Chinese Journal of Cancer Prevention and Treatment | 171              | 3.65%                          | 1284               | 3.73%                            |
| 3      | Acta Pharmaceutica Sinica                  | 59               | 1.26%                          | 850                | 2.47%                            |
| 4      | Chinese Journal of New Drugs and Clinical Remedies | 75               | 1.60%                          | 714                | 2.07%                            |
| 5      | China Pharmacy                            | 85               | 1.82%                          | 704                | 2.04%                            |
| 6      | Journal of International Pharmaceutical Research | 61               | 1.30%                          | 656                | 1.90%                            |
| 7      | Tumor                                     | 47               | 1.00%                          | 613                | 1.78%                            |
| 8      | Progress in Pharmaceutical Sciences        | 70               | 1.49%                          | 610                | 1.77%                            |
| 9      | Chinese Pharmaceutical Journal             | 53               | 1.13%                          | 517                | 1.50%                            |
| 10     | Journal of Practical Oncology              | 71               | 1.52%                          | 503                | 1.46%                            |
| Total  |                                            | 809              | 17.27%                         | 7738               | 22.45%                           |
3.4. **Analysis of Affiliation of the Cited Papers**

The top 10 affiliations of the cited papers on antineoplastic drugs are shown in Table 4. It shows the China Pharmaceutical University, the Second Military Medical University and Shanghai Institute of Materia Medica, Chinese Academy of Sciences are cited with frequency of 1252 (3.63%), 785 (2.28%) and 748 (2.17%) times, respectively.

**Table 4. Top 10 affiliations of the cited papers on antineoplastic drugs**

| Number | Cited affiliations                                      | Number of papers | Percentage of number of papers | Citation frequency | Percentage of citation frequency |
|--------|--------------------------------------------------------|------------------|-------------------------------|--------------------|----------------------------------|
| 1      | China Pharmaceutical University                        | 154              | 3.29%                         | 1252               | 3.63%                            |
| 2      | The Second Military Medical University                 | 67               | 1.43%                         | 785                | 2.28%                            |
| 3      | Shanghai Institute of Materia Medica, Chinese Academy of Sciences | 42               | 0.90%                         | 748                | 2.17%                            |
| 4      | Shandong University                                   | 61               | 1.30%                         | 684                | 1.98%                            |
| 5      | Peking University                                     | 50               | 1.07%                         | 629                | 1.83%                            |
| 6      | Tumor Hospital of the Chinese Academy of Medical Science | 48               | 1.02%                         | 537                | 1.56%                            |
| 7      | Peking Union Medical College Hospital, Chinese Academy of Medical Sciences | 24               | 0.51%                         | 534                | 1.55%                            |
| 8      | Shenyang Pharmaceutical University                    | 61               | 1.30%                         | 527                | 1.53%                            |
| 9      | Zhejiang University                                   | 62               | 1.32%                         | 523                | 1.52%                            |
| 10     | Nanjing University                                    | 24               | 0.51%                         | 336                | 0.97%                            |
| Total  |                                                        | 593              | 12.65%                        | 6555               | 19.02%                           |

3.5. **Analysis of the Research Fund of the Cited Papers**

The top 10 funded projects with high cited papers on antineoplastic drugs are shown in Table 5. It can be seen that the papers funded by National Natural Science Foundation of China, National High-Tech Research and Development Plan (863 Plan) and National Key Basic Research Development Plan (973 Plan) are cited with highest frequency, which are 4278 (12.41%), 959 (2.78%) and 913 (2.65%) times, respectively.

**Table 5. Top 10 fund projects of cited papers on antineoplastic drugs**

| Number | Cited funds                                      | Number of papers | Percentage of number of papers | Citation frequency | Percentage of citation frequency |
|--------|--------------------------------------------------|------------------|-------------------------------|--------------------|----------------------------------|
| 1      | National Natural Science Foundation of China      | 536              | 11.45%                        | 4278               | 12.41%                           |
| 2      | National High-tech Research and Development Plan (863 Plan) | 68               | 1.45%                         | 959                | 2.78%                            |
| 3      | National Key Basic Research Development Plan (973 Plan) | 63               | 1.35%                         | 913                | 2.65%                            |
| 4      | Guangdong Natural Science Foundation             | 25               | 0.53%                         | 249                | 0.72%                            |
| 5      | Jiangsu Natural Science Foundation               | 23               | 0.49%                         | 247                | 0.72%                            |
| 6      | Shanghai Science and Technology Development Fund | 17               | 0.36%                         | 196                | 0.57%                            |
| 7      | Anhui Natural Science Foundation                 | 13               | 0.28%                         | 192                | 0.56%                            |
| 8      | Shandong Natural Science Foundation              | 23               | 0.49%                         | 181                | 0.53%                            |
| 9      | Zhejiang Natural Science Foundation              | 24               | 0.51%                         | 164                | 0.48%                            |
| 10     | Special Fund for the Doctoral Program of Higher Education | 24               | 0.51%                         | 160                | 0.46%                            |
| Total  |                                                  | 816              | 17.42%                        | 7539               | 21.88%                           |
3.6. Analysis of the Subjects of the Cited Papers

All the cited papers are classified into different subjects. The interdisciplinary subjects are accounted into one of the closest subject of the interdisciplinary subjects. The results show that 4683 cited papers are from 62 subjects. The 10 subjects with the highest citation frequency are shown in Table 6. The papers on pharmacy, oncology and Science of Chinese Materia Medica have high citation frequency, which are 12036, 10078 and 2945 times, accounting for 34.92%, 29.24% and 8.55%, respectively.

Table 6. Top 10 cited subjects of cited papers on antineoplastic drugs

| Number | Cited subject                                      | Number of papers | Percentage of number of papers | Citation frequency | Percentage of citation frequency |
|--------|----------------------------------------------------|------------------|--------------------------------|--------------------|----------------------------------|
| 1      | Pharmacy                                           | 1669             | 35.64%                         | 12036              | 34.92%                           |
| 2      | Oncology                                           | 1251             | 26.71%                         | 10078              | 29.24%                           |
| 3      | Science of Chinese Materia Medica                  | 260              | 5.55%                          | 2945               | 8.55%                            |
| 4      | Organic Chemical Industry                          | 307              | 6.56%                          | 1500               | 4.35%                            |
| 5      | Clinical Medicine                                  | 189              | 4.04%                          | 1155               | 3.35%                            |
| 6      | Traditional Chinese Medicine                       | 52               | 1.11%                          | 871                | 2.53%                            |
| 7      | Preventive Medicine and Hygienics                  | 74               | 1.58%                          | 616                | 1.79%                            |
| 8      | Endocrine Glands and Systemic Diseases             | 57               | 1.22%                          | 480                | 1.39%                            |
| 9      | Cardiovascular Diseases                            | 63               | 1.34%                          | 435                | 1.26%                            |
| 10     | Obstetrics and Gynecology                          | 59               | 1.26%                          | 416                | 1.21%                            |
| Total  |                                                    | 3981             | 85.01%                         | 30532              | 88.59%                           |

3.7. Analysis of the Top 20 Cited Papers

3.7.1. Analysis of cited period

The papers with top 20 citation frequency are selected for further analysis. Let \(N_0\) denote the number of citations in the year of publication, \(N_1\) the number of citations in the first year after publication, \(N_2\) the number of citations in the second year after publication and so on. The analysis of the data collected about citation frequency of the papers in the different citation years shows that the values of \(N_2\) to \(N_9\) are the highest and they are between 140 to 192, and 1344 in total, accounting for 67.70%. This indicates that the highly cited papers on antineoplastic drugs are the most frequently cited in the 2nd to the 9th years after publication. \(N_4\) and \(N_5\) are larger than others, which are 186 and 192, accounting for 9.37% and 9.67%, respectively. \(N_{12}\) and \(N_{13}\) are significantly small, which are 77 and 87, accounting for 3.88% and 4.38%, respectively (see Table 7).

The citation frequency, percentage and average citation times of the 20 papers in the fifth year after publication are the highest. The top 20 papers are cited 99.25 times on average. Among them, 11 (55.00%) are experimental research papers, and the other 9 (45.00%) are review papers.
| No. | Title                                                                                                      | Publication period (issue) | Citation frequency | N₀ | N₁ | N₂ | N₃ | N₄ | N₅ | N₆ | N₇ | N₈ | N₉ | N₁₀ | N₁₁ | N₁₂ | N₁₃ | N₁₄ | N₁₅ | N₁₆ | N₁₇ | N₁₈ | N₁₉ |
|-----|-----------------------------------------------------------------------------------------------------------|----------------------------|------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 1   | New research approaches in anti-tumor drug                                                              | 2000 (03)                  | 218              | 0  | 5  | 7  | 4  | 10 | 19 | 27 | 22 | 25 | 16 | 16  | 10  | 14  | 10  | 5  | 9  | 7  | 2  |
| 2   | Advance in studies on anti-tumor activity of polysaccharides in latest five years                        | 2013 (08)                  | 191              | 5  | 24 | 32 | 45 | 58 | 27 | 27 | 27 | 27 | 27 | 27  | 27  | 27  | 27  | 27 | 27 | 27 | 27 |
| 3   | Study on anti-tumor activity of ginsenoside Rg₁ and Rh₁                                                  | 2003 (01)                  | 131              | 0  | 3  | 4  | 13 | 5  | 5  | 3  | 12 | 12 | 11 | 10  | 14  | 14  | 14  | 14 | 14 | 14 | 14 |
| 4   | Anti-tumor effect of paecol in vitro and in vivo                                                        | 2002 (03)                  | 116              | 0  | 3  | 6  | 8  | 9  | 15 | 7  | 10 | 9  | 7  | 8   | 12  | 6   | 8   | 12  | 6  | 8  | 12  | 6  |
| 5   | Comparison of MTT with SRB assays in vitro anticancer drug screening                                    | 1999 (03)                  | 114              | 0  | 0  | 1  | 0  | 2  | 8  | 8  | 10 | 9  | 6  | 10  | 10  | 9   | 8   | 10  | 9  | 10 | 7  | 7  |
| 6   | Progression of lobaplatin as the third generation platinum drug                                         | 2009 (12)                  | 110              | 0  | 0  | 7  | 17 | 20 | 19 | 13 | 15 | 10 | 9  | 10  | 13  | 15  | 13  | 15 | 10 | 9  | 7  |
| 7   | Advances in anti-tumor mechanisms of demene Antagonistic effect of Angelica Sinesis (Oliv.) Diels Lactone (ASDL) on the immunosuppressive response induced by Cyclosporin A, Hydrocortisone and antitumor agents | 2000 (05)                  | 102              | 0  | 3  | 5  | 8  | 4  | 3  | 13 | 10 | 11 | 6  | 12  | 6   | 6   | 4   | 2  | 1  | 1  | 4  |
| 8   | Signal transduction by protein tyrosine kinases and antitumor agents                                   | 2008 (04)                  | 97               | 1  | 3  | 6  | 2  | 4  | 7  | 11 | 7  | 7  | 8   | 8   | 6   | 3   | 5   | 4  | 3  | 4  | 6  |
| 9   | Advances in research on anti-malignant tumors of traditional Chinese medicine                           | 2006 (04)                  | 95               | 1  | 4  | 13 | 9  | 7  | 13 | 10 | 12 | 15 | 10  | 13  | 13  | 13  | 13  | 13 | 13 | 13 | 13 |
| 10  | Progress research of antitumor agents vinblastine analogues and induced apoptosis of liver cancer cell SMMC-7721 by drug serum of Jianpi Liqi herbs | 2005 (07)                  | 92               | 0  | 4  | 5  | 7  | 9  | 11 | 4  | 11 | 10 | 12  | 5   | 6   | 7   | 1   | 7  | 1  | 7  | 1  |
| 11  | Inhibition of telomerase activity and induced apoptosis of liver cancer cell SMMC-7721 by drug serum of Jianpi Liqi herbs | 2000 (08)                  | 89               | 0  | 1  | 6  | 6  | 6  | 6  | 7  | 7  | 6  | 11  | 13  | 7   | 5   | 4   | 3  | 0  | 1  | 0  |

Note: N₀ indicates the citation frequency in the year of publication, N₁...N₁₉ indicates the citation frequency in the first year to the 19th year after publication, respectively; the last cited year is 2018. ✓ indicates the end.
Table 7 (Continued). The distribution of the title, publication year (issue), citation frequency and citation period of the top 20 cited papers

| No. | Title                                                                 | Publication period (issue) | Citation frequency | N0 | N1 | N2 | N3 | N4 | N5 | N6 | N7 | N8 | N9 | N10 | N11 | N12 | N13 | N14 | N15 | N16 | N17 | N18 | N19 |
|-----|------------------------------------------------------------------------|----------------------------|--------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 13  | Effects of tanshinone II A and its nanoparticles on apoptosis and expression of p38 MAPK and TGFβ signaling proteins of hepatoma cells in mice Correlation between experimental results of MTT colorimetric assay and SRB assay in anti-tumor drug screening in vitro | 2008 (01)                 | 75                 | 3  | 17 | 10 | 10 | 6  | 11 | 6  | 8  | 2  | 2  | 0  |     |     |     |     |     |     |     |     |     |
| 14  | Studies on the biotransformation of escin Ia by human intestinal bacteria and the anti-tumor activities of desacylescin I | 2009 (04)                 | 74                 | 0  | 4  | 9  | 9  | 8  | 13 | 9  | 11 | 7  | 4  |     |     |     |     |     |     |     |     |     |     |
| 15  | Studies on antineoplastic constituents from marine organisms in south China sea Study on chemotherapy-induced disorders of glucose metabolism in patients with malignant ovarian tumor Extraction and isolation of ampelopsin from Ampelopsis cantoniensis Planch and its inhibitory effect on B16 Melanoma The Development of ruthenium complexes as anticancer drugs activation and anticancer mechanism | 2004 (01)                 | 66                 | 3  | 0  | 2  | 6  | 6  | 2  | 6  | 9  | 3  | 4  | 4  | 6  | 6  | 3  |     |     |     |     |     |     |     |
| 16  | Advances in studies on antineoplastic drugs originated from plant | 2007 (02)                 | 61                 | 0  | 5  | 7  | 7  | 9  | 8  | 5  | 4  | 5  | 6  | 3  | 3  |     |     |     |     |     |     |     |     |     |
|     | Total                                                                   |                            | 1985               | 15 | 88 | 142| 168| 186| 192| 160| 185| 171| 140| 110| 105| 77 | 87 | 48 | 34 | 31 | 24 | 15 | 7  |
|     | Percentage/%                                                             |                            | 99.99              | 0.76| 4.43| 7.15| 8.46| 9.37| 9.67| 8.06| 9.32| 8.62| 7.05| 5.54| 5.29| 3.88| 4.38| 2.42| 1.71| 1.56| 1.21| 0.76| 0.35|
|     | The average frequency of cited paper                                      |                            | 99.25              | 0.75| 4.40| 7.10| 8.40| 9.30| 9.60| 8.00| 9.25| 8.55| 7.00| 5.50| 5.25| 3.85| 4.35| 2.40| 1.70| 1.55| 1.20| 0.75| 0.35|

Note: N0 indicates the citation frequency in the year of publication, N1...N19 indicates the citation frequency in the first year to the 19th year after publication, respectively; the last cited year is 2018, ∨ indicates the end.
3.7.2. Analysis of first author’s affiliation

Among the 20 papers, 9 first authors are from colleges or universities, 4 from research institutes, 5 from hospitals affiliated to universities and research institutes, 1 from military hospitals and 1 from drug development companies (see Table 8).

Table 8. The first author, their affiliations and the source journals of the top 20 cited papers

| Number | First author   | Affiliations of first author                                                                 | Source journals                                                                 |
|--------|----------------|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|
| 1      | Ding Jian      | Shanghai Institute of Materia Medica, Chinese Academy of Sciences                           | Chinese Journal of New Drugs                                                   |
| 2      | Lin Jun        | Department of Pharmacology, Wannan Medical College                                         | China Journal of Chinese Materia Medica                                         |
| 3      | Chen Shengwu   | Jilin Institute of Natural Medicine,TianYao Science and Technology Co.,Ltd                  | Journal of Jilin University(Medicine Edition)                                  |
| 4      | Sun Guoping    | Institute of Clinical Pharmacology, Anhui Medical University                               | Acta Universitatis Medicinalis Anhui                                            |
| 5      | Tan Weidong    | Chengdu Di Ao Pharmaceutical Company of Academia Sinica                                    | Natural Product Research and Development                                        |
| 6      | Yang Liuqing   | Tumor Center of PLA,81 Hospital of PLA                                                       | Chinese Clinical Oncology                                                      |
| 7      | Zhou Hongyu    | Department of Neurosurgery, Renji Hospital Affiliated to Shanghai Second Medical University | Chinese Journal of Clinical Oncology                                            |
| 8      | Feng Jingqi    | Institute of Medical Biotechnology, Chinese Academy of Medical Sciences, Peking Union Medical College | Chinese Journal of Immunology                                                    |
| 9      | Mao Yongjun    | Shanghai Institute of Materia Medica, Chinese Academy of Sciences                           | Acta Pharmaceutica Sinica                                                       |
| 10     | Yao Zhihua     | Department of Oncology, the First Affiliated Hospital of Zhengzhou University               | Journal of Modern Oncology                                                      |
| 11     | Ding Yafang    | Department of Biosciences and Biotechnology, Dalian University of Technology               | Chinese Journal of Pharmaceuticals                                              |
| 12     | Meng Zhiqiang  | Department of Hepatology,Cancer Hospital of Shanghai Medical University                  | World Chinese Journal of Digestology                                            |
| 13     | Li Qi          | Department of Tumor, Putuo Hospital Affiliated to Shanghai University of Traditional Chinese Medicine | Tumour                                                                          |
| 14     | Huang Yinhui   | Department of Bioscience, Bengbu Medical College                                           | Journal of Biology                                                              |
| 15     | Yang Xiuewei   | State Key Laboratory of Natural & Biomimetic Drugs, Peking University School of Pharmaceutical Sciences | Journal of Peking University(Health Sciences)                                   |
| 16     | Yi Yanghua     | Research Center for Marine Drugs, College of Pharmacy, Second Military Medical             | Academic Journal of Second Military Medical University                          |
| 17     | Zhang Junji    | Department of Obstetrics and Gynecology, Peking Union Medical College, Chinese Academy of Medical Sciences | Chinese Journal of Obstetrics and Gynecology                                    |
| 18     | Liu Deyu       | Department of Chemistry, Sun Yat sen University of Medical Sciences                        | Academic Journal of Sun Yat-sen University of Medical Sciences                  |
| 19     | Liu Jie        | The Key Laboratory of Gene Engineering of Education Ministry, School of Chemistry and Chemical Engineering, Zhongshan University | Progress in Chemistry                                                          |
| 20     | Xie Jun        | Laboratory of Plant Ecology and Resources in Three Gorges Reservoir Region, Ministry of Education, Key | Chinese Traditional and Herbal Drugs                                           |
3.8. Analysis of Research Areas and Academic Characteristics

3.8.1. Analysis of research areas
210 papers on antineoplastic drugs with over 30 citation times are analyzed. The results show that there are 112 research papers, accounting for 53.33%, and 98 review papers, accounting for 46.67%.

The research fields of the research papers include pharmacology, clinical evaluation, occupational protection, adverse reactions, extraction techniques, chemistry, pharmaceuticals, new drug introduction and market analysis. The results are shown in Table 9.

Table 9. Research areas of cited papers on antineoplastic drugs (cited frequency ≥30 times)

| Classification of papers | Research direction                                      | Number of papers | Proportion | Total papers | Proportion |
|--------------------------|--------------------------------------------------------|------------------|------------|--------------|------------|
| Research papers          | Pharmacology                                           | 50               | 23.81%     | 112          | 53.33%     |
|                          | Clinical evaluation                                    | 18               | 8.57%      |              |            |
|                          | Occupational protection                                | 13               | 6.19%      |              |            |
|                          | Adverse drug reaction                                  | 11               | 5.24%      |              |            |
|                          | Chemistry                                              | 5                | 2.38%      |              |            |
|                          | Extraction process                                     | 4                | 1.90%      |              |            |
|                          | Pharmaceutics                                          | 3                | 1.43%      |              |            |
|                          | Introduction of new drugs                              | 3                | 1.43%      |              |            |
|                          | Market analysis                                        | 2                | 0.95%      |              |            |
|                          | Other                                                  | 3                | 1.43%      |              |            |
| Review papers            | A review of a certain class or an antineoplastic drug   | 39               | 18.57%     | 98           | 46.67%     |
|                          | A review of the pharmacological effects and mechanisms of a certain class or a chemical component | 22               | 10.48%     |              |            |
|                          | A review of the clinical application of a certain class of drugs | 13               | 6.19%      |              |            |
|                          | A review of adverse reactions of a certain class of drugs | 9                | 4.29%      |              |            |
|                          | Review of various aspects of antineoplastic drugs       | 8                | 3.81%      |              |            |
|                          | A review of the pharmacology and clinical application of a certain class or a certain drug | 7                | 3.33%      |              |            |

Total 210 100% 210 100%

3.8.2. Analysis of academic characteristics

3.8.2.1. Academic characteristics of research papers.
Among the 210 papers, there are 50 papers on pharmacological experimental research of antineoplastic drugs, accounting for 23.81%. They are mainly about the pharmacological action and mechanism of certain antineoplastic chemical components and extraction, which indicates that antineoplastic drug pharmacological mechanism is a hot research topic. For example, the paper “Study on anti-tumor activity of ginsenoside Rg1 and Rh1” is cited 131 times.

The number of papers on evaluation of clinical effects of antineoplastic drugs is 18, accounting for 8.57%. For example, the paper “Clinical results of three different intravesical instillation agents for the prevention of postoperative recurrence of bladder tumor” is cited 32 times.
The number of papers on impact and protection of antineoplastic drugs on the health of health care workers is 13, accounting for 6.19%. For example, the paper “Investigation of the health of the staff exposure to antineoplastics in hospital” is cited 50 times.

The number of papers on adverse reaction of antineoplastic drugs is 11, accounting for 5.24%. For example, the paper “Clinical analysis of 132 patients with drug-induced liver damage” is cited 34 times.

3.8.2.2. The academic characteristics of the review papers.

The citation frequency of various reviews on antineoplastic drugs are as follows:

- Review on a certain class of drugs or a specific medicine. For example, the paper “Advance in studies on anti-tumor activity of polysaccharides in latest five years” is cited 191 times.

- A review of the pharmacological effects and mechanisms of a class of or a certain chemical component. For example, the paper “Advances in anti-tumor mechanisms of elemene” is cited 102 times.

- A review of the clinical application of a class of or a certain drug. For example, the paper “Pegasparagse: a review of clinical studies” is cited 48 times.

- Review on adverse reactions of a class of drugs. For example, the paper “Cardiotoxicity of anthracyclines” is cited 48 times.

- Review of various aspects of antineoplastic drugs. For example, the paper “New research approaches in anti-tumor drug” is cited 218 times.

- A review of the pharmacology and clinical application of a class of or a certain drug. For example, the paper “Pharmacology and clinical use of cepecitabine” is cited 60 times.

4. Discussion

Through the descriptive analysis of the cited papers on antineoplastic drugs, the basic characteristics are obtained, which indicates the direction for the journal editors’ drafts organization and reservation.

The editors should focus on some important sources for manuscript reservation. It is found in this study that the most of the highly cited papers come from universities and their affiliated hospitals and research institutes. These institutions have strong scientific research capability which have produced a large number of papers and are the places where the scientific researchers perform research activities. Because of this, editors should communicate and corporate with these researchers, understand their research trends, and reserve their manuscripts.

The editors should pay attention to the review papers. A review paper is a comprehensive and targeted document formed by analyzing, evaluating, and summarizing relevant literatures. It has been processed by the author and its contents are comprehensive with high value. Therefore, proper publication of some high-level review papers is conducive to improve the citation frequency and journal’s influence.

The editors should initiate and augment the fast publication process. i.e., quick peer review. It is found that most of the highly cited papers are from fund-funded papers, and the most famous fund is the National Natural Science Foundation. Thus, the editor should have a fast process for fund papers, to give high priority to fund papers in reviewing, editing, recruitment, and publication to attract more funds to fund excellent papers and to enhance authors' attention to journals, and to establish a relatively stable author pool.

Journals should establish a core author group. It is suggested that the highly cited authors are selected to form the core authors group in the relevant fields of the journal. Through network communication, academic conferences and face-to-face communication in the laboratory, the editors can effectively connect with the core authors to get more papers of high quality.

Editors should plan for new columns on major issues. Analysis of highly cited papers on antineoplastic drugs shows that pharmacological effects, mechanisms, clinical evaluation and other related fields are major issues for consideration. Editors should start relevant columns to keep up with the frontiers of scientific research. If a series of research papers in the fields can be published, then a featured section of the publication can be formed.
5. Conclusion
The papers with high citation frequency are those about antineoplastic drugs in pharmacological effects and mechanisms, clinical evaluation, occupational protection, adverse reactions, as well as various reviews. Editors of journal should focus to organize and absorb above ideas in selecting manuscripts to fully exploit the excellent manuscript sources, and to improve the quality and influence of journals.

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7. References
[1] Wu Qiong. Analysis of highly cited papers published by ERC during 1985-2010[J]. Recent Developments in World Seismology, 2013, (5): 31-38.
[2] Ma Yuntong. An analysis of the highly cited literature published in Journal of Xi'an University of Arts and Science (Natural Science Edition)[J]. Journal of Xi'an University of Arts & Science (Natural Science Edition), 2011, 14(4): 124-128.
[3] Qu Qinghui, Zhang Xinyang, Huang Chongya. Study of the highly cited papers based on Panax Notoginseng[J]. Journal of Preventive Medicine Information, 2018, 34(11): 1365-1373.
[4] Ma Yuntong. Analysis of highly cited papers from Tangdu Journal[J]. Tangdu Journal, 2018, 34(4): 80-83.
[5] Li Yang. Analysis of features of highly-cited papers in Journal of Dali University[J]. Journal of Dali University, 2018, 3(12): 98-102.
[6] Ma Yuntong. Analysis of high-cited papers of publication subject research published in domestic periodicals from 2006 to 2010[J]. Acta Editologica, 2012, 24(4): 335-338.
[7] Yang Junli. An research on the highly-cited papers of Journal of Library Science in China[J]. Journal of Library Science in China, 2012, 30(3): 90-93, 96.
[8] Hu Qinghua. Characteristic analysis and enlightenment of highly cited papers from 2002 to 2011 in Journal of Zhejiang University (Agriculture and Life Sciences Edition)[J]. Chinese Journal of Scientific and Technical Periodicals, 2013, 24(4): 699-702.
[9] Qu Qinghui, Huang Chongya, Zhang Xinyang, et al. Study of the highly cited papers in Northwest Pharmaceutical Journal and the editing strategy[J]. Science Discovery, 2017, 5(4): 262-269.
[10] Li Rong, Sun Bo, Yang Yu, et al. Characteristic analysis of the highly cited papers in West China Journal of Pharmaceutical Sciences[J]. West China Journal of Pharmaceutical Sciences, 2017, 32(6): 666-668.
[11] Bao Yongqing. Analysis on citations of doctoral dissertations on oncology[J]. Information Research, 2014, (10): 23-25.
[12] Sun Guoping, Shen Yuxian, Zhang Lingling, et al. Anti-tumor effect of paenol in vitro and in vivo[J]. Acta Universitatis Medicinalis Anhui, 2002, 37(3): 183-185.
[13] Chen Shengwu, Wang Yan, Wang Yi, et al. Study on anti-tumor activity of ginsenoside Rg1 and Rh1[J]. Journal of Jilin University(Medicine Edition), 2003, 29(1): 25-28.
[14] Zhao Yong, Kang Hongmei, Lu Liying. Clinical results of three different intravesical instillation agents for the prevention of postoperative recurrence of bladder tumor[J]. Journal of Clinical Urology, 2000, 15 (6): 251-252.
[15] Wang Jing, Li Yaqian, Zhou Yulu, et al. Review of therapeutic drug monitoring of anticancer drugs[J]. The Chinese Journal of Clinical Pharmacology, 2018, 34(24): 2889-2893.
[16] Ding Jian. New research approaches in anti-tumor drug[J]. Chinese Journal of New Drugs, 2000, 9(3) 149-154.
[17] Ma Liting, Dong Naiwei. Research progress on mechanisms of inhibiting tumor activity by chalcone derivatives[J]. Chinese Journal of New Drugs and Clinical Remedies, 2019, 38(1): 1-9.
[18] Zhang Haihong, Liu Yongfei, Yang Hui. Advances in the treatment of glioma with antineoplastic drugs across the blood-brain barrier[J]. China Journal of Pharmaceutical Economics, 2018, 13(12): 127-129.

[19] Tsinghua University. Chinese Citation Database. [EB/OL]. [2019-01-11]. http://ref.cnki.net/ref.