



The Application Status of STROBE Guidelines and the improving strategy for the Medical Journals: A Study of CSCD indexed Biomedical Journals in Shanghai

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Keywords: STROBE; PubMed; Chinese Science Citation Database (CSCD); Cohort study; Case-control study; Cross-sectional study; AIGC

Abstract:

Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement guidelines provides important reference for editing or writing observational studies. In order to improving the editorial quality of retrospective study published in medical journals, this study analyzed the application status of STROBE guidelines of Shanghai biomedical Journals indexed in CSCD, and provide the scientific-rigor-improving strategy for writing and editing the retrospective study in medical journals. Firstly, all the articles published from 2023-2024 which mentioned STROBE in the full-text was retrieved through PubMed. Then we retrieved the CSCD-indexed medical journals in Shanghai which published the retrospective studies, meanwhile with the full-text word cohort study, cross-sectional study and case-control study showed in the title or abstracts. RAWGraphs 2.0 was used to draw Sanky diagram. GraphPad Prism 10.0 software was used to carry out non-parametric tests and to draw Violin Plot in this study. The AIGC large language model Kimi Moonshot (<https://kimi.moonshot.cn/>) is used to validate statistical results. Besides, Wilcoxon rank-sum test was used to compare the retrospective term in title and in abstracts. The result of this study showed that, 26 medical journals published clinical research articles were included (biological journals were excluded) in this study, with 7 journals in English, 19 journals in Chinese. Compared with the title, the terms of retrospective cohort, case-control study or cross-sectional were more frequently showed in the abstracts. Wilcoxon rank-sum test showed that there was significance difference between the title and the abstract ($P < 0.05$). According to the 22 items released by STROBE Statement checklist, this study found that the main issues existed in the articles contains but not confined in the following aspects: 1) The title or abstract does not specify the type of research. 2) Mis-use of research types, retrospective cohort study is sometimes mis-considered as case-control study. 3) Statistical analysis issues. 4) Flowchart is always missing in the article. 5) Bias analysis and limitation analysis are always not included in the article. All the existed problems should be equally solved. Therefore, we could see that, strictly following STROBE items for writing or editing is beneficial for improving the writing quality and scientific rigor of a medical journal.

1 | Introduction

Medical research could be divided mainly into clinical research and experimental studies, and the former, i.e. clinical research may further be divided into clinical trials and observational studies. Among which, observational studies have numerous classifications based on types and research fields, mainly including cohort studies, case-control studies, and cross-sectional studies. Currently, for observational studies, the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement guideline^[1] provides important reference regardless of editing or writing guidelines for observational studies. STROBE was firstly published on Enhancing the QUALity and Transparency Of health Research (EQUATOR) Network^[2] and simultaneously in 8 journals^[2-3]. Guidelines from EQUATOR are also adopted by PubMed, as the scientific quality assessment standards, for processing the scientific and editorial character and quality of the articles published on the journal if it merits the inclusion criteria of PMC. Since its inception, STROBE has been recognized by numerous international medical journals and has improved the quality of observational research reports, and was translated into several languages all over the world. At present, there are still many problems in adopting STROBE in editing and publishing for medical journals, and the disclosure information and quality of observational studies published in medical journals are uneven.

Chinese Science Citation Database (CSCD) was Established in 1989, and it is now the most prestigious citation database in China, which indexes more than a thousand excellent journals involving mathematics, physics, chemistry, astronomy, geology, biology, medicine, etc. In order to improving the editorial quality of retrospective study published in medical journals, this study analyzed the application status of STROBE guidelines of Shanghai biomedical Journals indexed in CSCD, and provide the scientific-rigor-improving strategy for writing and editing the retrospective study in medical journals .

2 | Research methods and data sources

2.1 | Database retrieval and analysis

Different language database, including English and Chinese [theoretically PubMed vs. Chinese Science Citation DatabaseSM (1989-present)/CNKI & sinoMed] should be retrieved. PubMed has three sub-databases: MEDLINE, PubMed Central (PMC) and BookShelf^[4-5]. PubMed provides full-text word search and MeSH keyword search. CNKI and sinoMed were retrieved for the Chinese journals^[6] (The journals of Chinese Medical Association were all retrieved from the Chinese Medical Association Journal Network). As all the journals were indexed by CSCD, this study retrieved CSCD for all the journals.

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2.1.1 Retrieval content

1) Key word ‘STROBE’ occurred in the articles in PubMed and CSCD; 2) The characteristics of the Shanghai medical journals indexed in CSCD, as the retrospective studies always belong to the clinical medicine area, therefore the biological journals were excluded in this study. 3) The retrospective study, cohort study, cross-sectional study, case-control study of the Shanghai medical journals indexed in CSCD were retrieved.

2.1.2 | Retrieval Strategy for CSCD and PubMed

CSCD provides Key words retrieval; therefore, we used CSCD sublibrary of the WOS database [Chinese Science Citation DatabaseSM (1989-present)] to retrieve. We chose the ‘Topic’ (including title, abstract, author and keywords) and input the key words in the ‘query preview’ to retrieve. The result showed nearly the same to the retrieving CNKI combined with sinoMed. The minor difference might because the keywords from abstracts.

PubMed provides Key words or Medical Subject Headings (MeSH) retrieval; therefore, we took PubMed retrieval strategy as an example. Retrieval Strategy: Search ("STROBE"[All Fields] OR "STROBEs"[All Fields]) AND ("cohort studies"[MeSH Terms] OR "cohort studies"[All Fields] OR "cohort study"[All Fields] OR "case control studies"[MeSH Terms] OR "case control studies"[All Fields] OR "case control study"[All Fields]) OR ("case control studies"[MeSH Terms] OR "case control studies"[All Fields] OR "case control study"[All Fields]) OR ("cross-sectional studies"[MeSH Terms] OR "cross sectional studies"[All Fields] OR cross sectional study"[All Fields])) Sort by: Most By 2023-2024, articles published by the journals indexed by PMC.

2.2 | Analysis of the application of STROBE in CSCD-indexed Chinese journals

PMC's increasingly stringent Scientific and Editorial Quality Assessment standard for evaluating the writing and editing^[1-2] of the articles published by a medical journal, depends on the guidelines of different types of the research articles released by EQUATOR Network^[1]. As some of the journals included in this journal has already been indexed by MEDLINE or PMC. Therefore, we took the Chinese journals only indexed by CSCD as the example, to find out the current faults and flaws of inappropriately editing and writing of the articles published from 2023 to 2024 according to the items of STROBE checklist.

2.3 | Statistical processing and AIGC validating

RAWGraphs 2.0 was used to draw Sanky diagram. GraphPad Prism 10.0 software was used to carry out non-parametric tests and to draw

Violin Plot in this study. The AIGC large language model Kimi Moonshot (<https://kimi.moonshot.cn/>) is used to validate statistical results.

3 | Results and analysis

3.1 | Characteristics of CSCD indexed journals in Shanghai

According to the data released by *Annual Report of Shanghai Periodicals*^[7] and *Overview of Shanghai Scientific Journals 2023*^[8], there are 108 journals indexed by CSCD, among which, 26 medical journals published clinical research articles were included (biological

journals were excluded) in this study, with 7 journals in English, 19 journals in Chinese. As far as the database index, 7 journals are indexed by PubMed. Key words or Medical Subject Headings (MeSH) retrieval results showed that, commonly used term of the study (retrospective cohort, case-control study or cross-sectional) were rarely indicated in the title. Meanwhile, the cohort studies that could be divided into prospective cohort and retrospective cohort, unfortunately, the types of the cohort study were all unclarified in the title. The basic information of the CSCD-indexed medical journals in Shanghai and the corresponding published retrospective studies clarified in the titles are shown in Table 1.

TABLE 1 | The basic information of the medical journals indexed by CSCD in Shanghai and the published retrospective studies

Journals indexed by CSCD	ISSN	Indexed by CSCD /PubMed /WoS	Language	STROBE [▲]	Retrospective study		Cross-sectional study [*]	Case-control study [*]	Cohort study [*]		
					Full-text [▲]	Title [*]			Unclear [#]	Retrospective	Prospective
<i>Fudan University Journal of Medical Science</i>	1672-8467	CSCD	Chinese	0	81	5	3	1	0	2	0
<i>Journal of Environmental and Occupational Medicine</i>	2095-9982	CSCD	Chinese	5	31	1	0	1	2	0	5
<i>Journal of Clinical Pediatrics</i>	1000-3606	CSCD	Chinese	3	203	7	2	0	4	0	0
<i>Journal of Shanghai Jiao Tong University (Medical Science)</i>	1674-8115	CSCD	Chinese	1	61	1	1	1	1	0	1
<i>Journal of Interventional Radiology</i>	1008-794X	CSCD	Chinese	2	8	2	1	0	0	0	0
<i>Shanghai Journal of Stomatology</i>	1006-7248	CSCD /PubMed	Chinese	3	21	1	0	0	0	0	0
<i>Academic Journal of Naval Medical University</i>	2097-1338	CSCD	Chinese	2	81	2	0	0	2	0	0
<i>Chinese Traditional and Herbal Drugs</i>	0253-2670	CSCD	Chinese	2	19	2	1	0	0	0	0
<i>China Oncology</i>	1007-3639	CSCD	Chinese	2	71	4	1	0	1	3	0
<i>Chinese Journal of Infection and Chemotherapy</i>	1009-7708	CSCD	Chinese	0	79	1	0	0	0	0	0
<i>Chinese Journal of Parasitology and Parasitic Diseases</i>	1000-7423	CSCD	Chinese	0	12	1	0	1	0	0	0
<i>Health Development and Policy Research</i>	2097-4205	CSCD	Chinese	0	9	0	0	0	0	0	0
<i>Chinese Journal of New Drugs and Clinical Remedies</i>	1007-7669	CSCD	Chinese	1	46	1	0	0	0	0	0
<i>Chinese Journal of Evidence Based Pediatrics</i>	1673-5501	CSCD	Chinese	9	63	8	14	5	4	8	3
<i>Chineses Journal of Cancer Biotherapy</i>	1007-385X	CSCD	Chinese	2	21	2	0	0	0	2	0
<i>Chinese Journal of Endocrinology and Metabolism</i>	1000-6699	CSCD	Chinese	0	52	4	1	0	4	1	3
<i>Chinese Journal of Infectious Diseases</i>	1000-6680	CSCD	Chinese	0	39	1	1	0	0	0	0
<i>Chinese Journal of Hand Surgery</i>	1005-054X	CSCD	Chinese	0	39	2	0	1	0	0	0
<i>Chinese Journal of Digestion</i>	0254-1432	CSCD	Chinese	0	37	2	0	0	0	0	0
<i>Journal of Sport and Health Science</i>	2095-2546	CSCD /PubMed /SCIE/SSCI	English	1	3	1	1	0	4	0	9

<i>Asian Journal of Urology</i>	2214-3882	CSCD /PubMed /ESCI	English	0	32	5	1	0	0	0	1
<i>Asian Journal of Andrology</i>	1008-682X	CSCD /PubMed /SCIE	English	0	62	9	3	0	0	3	1
<i>Journal of Acupuncture and Tuina Science</i>	1993-0399	CSCD/E SCI	English	0	8	2	0	0	9	0	3
<i>Translational Neurodegeneration</i>	2047-9158	CSCD /PubMed /SCIE	English	0	1	0	0	0	1	0	1
<i>General Psychiatry</i>	2517-729X	CSCD /PubMed /ESCI	English	0	3	1	5	0	4	0	4
<i>Journal of Integrative Medicine</i>	2095-4964	CSCD /PubMed /SCIE	English	0	3	2	0	0	0	2	0

^: Full-text word 'STROBE' retrieval. *: Key word or Medical Subject Headings (MeSH) retrieval of the title of the articles.
#: Unclear through the title, need to be specified which type of cohort study by check the abstracts.

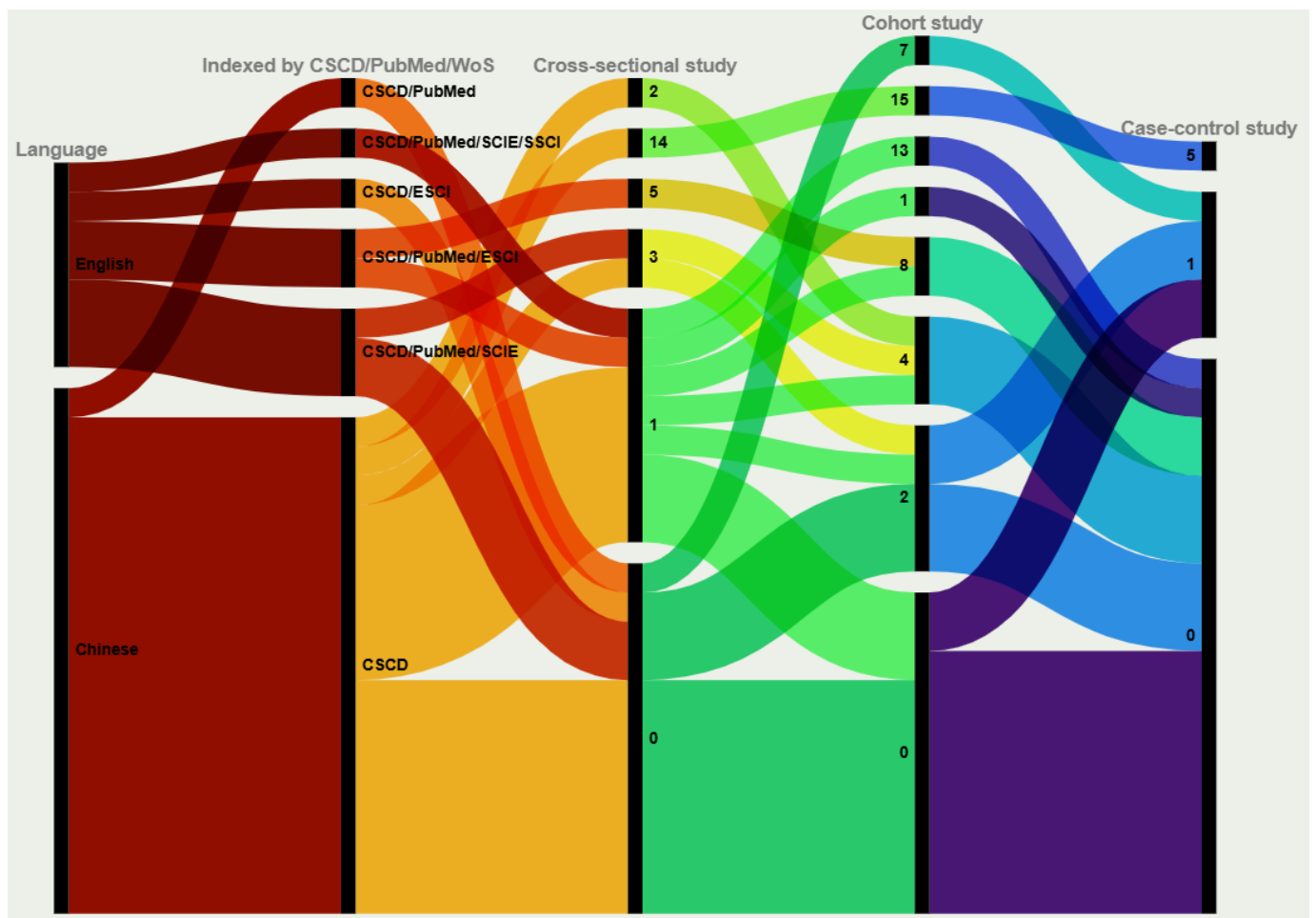


FIGURE 1 | The basic information of the medical journals indexed by CSCD in Shanghai and the corresponding published retrospective studies

3.2 | Sanky diagram analysis

The relationship between the characteristics and different type of retrospective studies named in the titles were displayed by Sanky diagram in Figure 1, from which we could see that Chinese journals account for the highest proportion, the studies types distribution would also be seen.

The Sankey diagram, also known as the Sankey energy flow diagram or Sankey energy balance diagram, is characterized by the fact that the total width of the branches at the start and end is equal. That is, the sum of the widths of all main branches should be equal to the sum of the widths of all the outgoing sub-branches, maintaining a balance of energy. It is used to analyze the relationships between various categories and to visualize data. In this study, the number of the retrospective studies only included the terms (retrospective cohort, case-control study or cross-sectional) indicated in the title of the article; the terms exhibited in other places of the articles were excluded.

3.3 | Distribution analysis of the retrospective study terms in title and abstract by Violin Plot

The Violin Plot is used to display the distribution status and probability density of multiple sets of data.

This figures are composed of the characteristics of box plots and density plots, mainly used to display the distribution shape of data. Similar to a box plot, but better displayed at the density level. The violin plot is particularly suitable when the amount of data are very large and it is inconvenient to display them one by one. The distribution of the terms of retrospective study (retrospective cohort,

case-control study or cross-sectional) used in the title or the abstract of the journals were analyzed by Violin Plot (Figure 2. A-B).

Compared with the title, the terms of retrospective cohort, case-control study or cross-sectional were more frequently showed in the abstracts. Wilcoxon rank-sum test showed that there were significance differences between the title and the abstract ($P<0.05$).

Owing to the negative result showed in Violin Plots, we carried out the Truncated Violin Plots to observe the positive distribution in Violin Plots. Truncated Violin Plots showed in Figure 2. C-D. The results showed that cohort study account for the highest proportion, and the key words (retrospective cohort, case-control study or cross-sectional) were more shown both in abstracts that in titles, there was statistically significant ($P<0.05$). Besides, it was more easily seen in abstracts than in titles of the articles.

3.4 | Analysis of the application of STROBE in CSCD indexed Chinese journals

The STROBE guideline checklist has 6 components: Title and abstract, Introduction, Methods, Results, Discussion and other information, and could be subdivided into 22 items.

The results showed that, among the articles published on the Chinese medical journals only indexed by CSCD from 2023 to 2024 (in Figure 1.), according to the items of STROBE checklist, the mainly inappropriate editing and the elements' missing of the recommendations are mainly focused on the following aspects: 1) The study's design with a commonly used term (retrospective cohort, case-control study or cross-sectional) is mostly not indicated in the title, some articles missed the terms either in the title and in the abstract, most articles only used 'retrospective study' or 'retrospective' to describe the study type; 2) Setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection sometimes are not specified; 3) The flowcharts of inclusion and exclusion criteria of the patients are always missing in the published articles enrolled in this study. 4) Bias analysis and limitation discussion were always missing; 5) Statistical methods problems. 6) Others.

The mainly deficiency of recommendations according to STROBE checklist of the Chinese medical journals were displayed in Table 3.

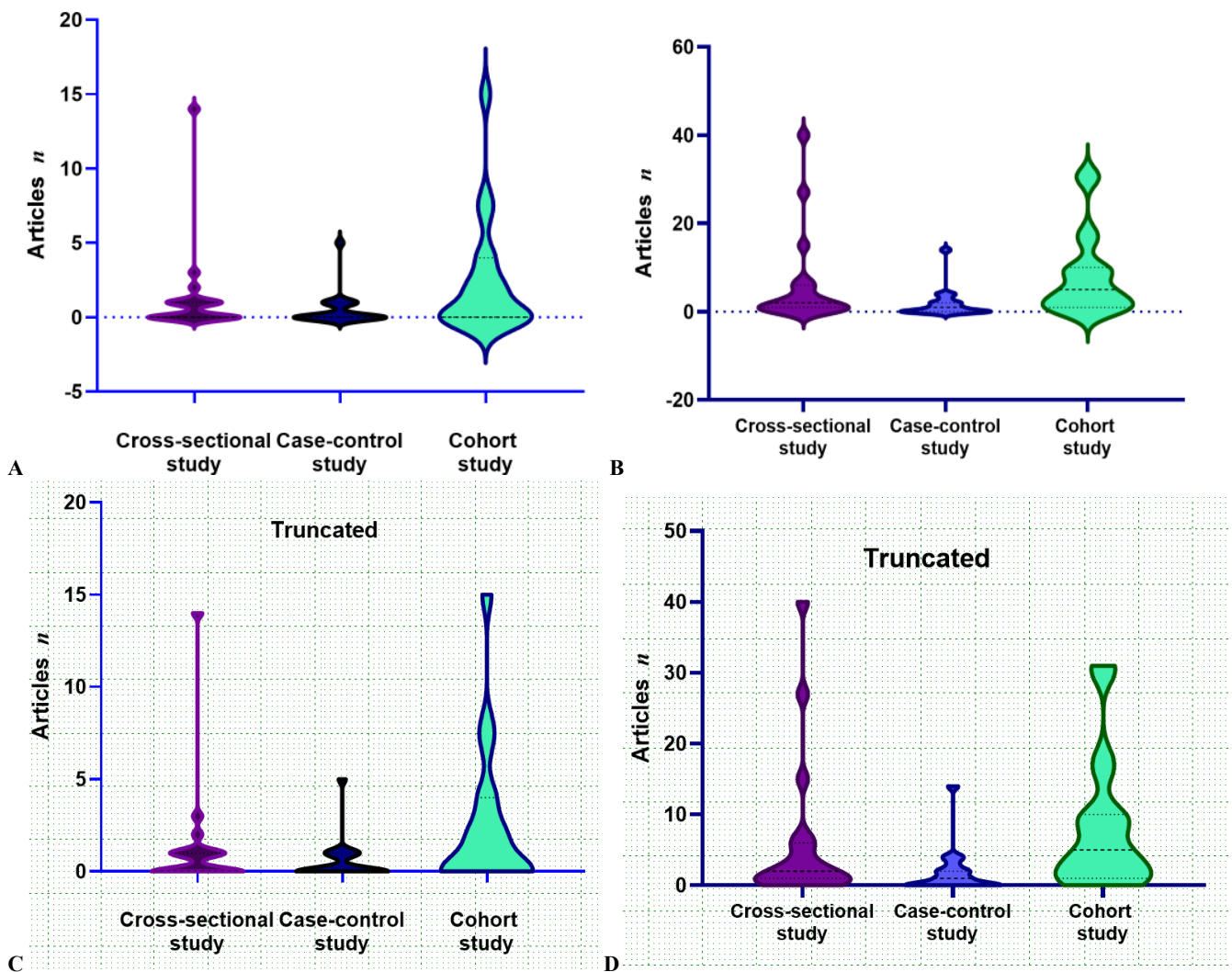


FIGURE 2 | The terms (retrospective cohort, case-control study or cross-sectional) used in the title or the abstract of the journals by Violin Plot

A: The terms of retrospective cohort, case-control study or cross-sectional showed in the title; B: The terms showed in the abstracts. C-D: Truncated Violin Plots of A and B. The retrospective studies published on the medical journals CSCD-indexed in Shanghai with the language Chinese from 2023-2024 were analyzed by Violin Plot. The key words of the three retrospective study types displayed in the abstract were more frequently than those in the titles, which showed significant differences ($P < 0.05$). The volume of cohort study is larger than those of cross-sectional and case-control study, which showed significant differences, either.

Regarding the issues in statistics, many studies directly use t -tests without conducting normality tests to analyze if the data is normal distributed, and the data in a passage is sometimes not clearly demonstrated if it is quantitative variable or qualitative variable. Therefore, if the continuous random quantitative data conforms to a normal distribution through normality testing and the variances are

homogeneous, Student's t -test should be performed; while if the variances are heterogeneous, Welch's t -test is preferred. If it does not follow a normal distribution, non-parametric test such as Wilcoxon rank sum test is recommended.

TABLE 2 | The mainly deficiency of recommendations according to STROBE checklist of the Chinese medical journals

Location of an article	Item No	Recommendation missing
Title and abstract	1	A term commonly used term in the title or the abstract (retrospective cohort, case-control study or cross-sectional) is not indicated, and Most were indicated in the text
Methods		
Setting	5	The setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection sometimes were missing
Participants	6	(a) Cohort study: methods of follow-up were not sufficient; matching criteria and number of exposed and unexposed; not specified with the name retrospective cohort study Case-control study: the rationale for the choice of cases and controls sometimes were not clarified; Cross-sectional study: the eligibility criteria, and the sources and methods of selection of participants were not sufficient
Variables	7	Exposures, predictors, potential confounders, and effect modifiers were eligible to be missed
Data sources/ measurement	8	For each variable of interest, sources of data and details of methods of assessment (measurement) were deficient. No-description of comparability of assessment methods if there is more than one group
Bias	9	Bias descriptions were always missing
Quantitative variables	11	Quantitative variables were sometimes not mentioned
Statistical methods	12	Not comprehensive of all the following aspects (a) All statistical methods should be described (b) Any methods used to examine subgroups and interactions should be described (c) How missing data were addressed? (d) Cohort study--loss to follow-up was always not addressed Case-control study--how matching of cases and controls was addressed need further explained Cross-sectional study--analytical methods taking account of sampling strategy need further explained (e) 95% confidence interval (CI) needs to be clarified
Results	13-17	The results should be supplement according to the methods above
Discussion		
Limitations	19	Limitations of the study should be discussed (sources of potential bias or imprecision)
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence

4 | Discussion

4.1 | Why we use STROBE?

STROBE is the guideline for reporting observational studies, and could be reviewed and download from the EQUATOR (Enhancing the QUALity and Transparency Of health Research) Network, which

is an international initiative that seeks to improve the reliability and value of published health research literature by promoting transparent and accurate reporting and wider use of robust reporting guidelines. STROBE was published on EQUATOR Network and simultaneously in 8 journals and could be read in any of these journals (Table 3). Journal's title and the correspondent PMID were showed in Table 3.

TABLE 3 | The Journals where STROBE published simultaneously with EQUATOR NETWORK

Journals where STROBE published	PMID
<i>Ann Intern Med</i> , 2007, 147(8): 573-577.	PMID: 17938396
<i>PLoS Med</i> , 2007, 4(10): e296.	PMID: 17941714
<i>BMJ</i> , 2007, 335(7624): 806-808.	PMID: 17947786
<i>Prev Med</i> , 2007, 45(4): 247-251.	PMID: 17950122
<i>Epidemiology</i> , 2007, 18(6): 800-804.	PMID: 18049194
<i>Lancet</i> , 2007, 370(9596): 1453-1457.	PMID: 18064739
<i>J Clin Epidemiol</i> , 2008, 61(4): 344-349.	PMID: 18313558
<i>Bull World Health Organ</i> , 2007, 85(11): 867-872.	PMID: 18038077

In China, many journals' editors are not yet familiar with STROBE guideline^[9-10], even are not aware of it, and have not used STROBE guidelines to guide authors in writing and edit articles of retrospective studies, according to the guidelines on one hand. On the other hand, many medical journals' editors in China have insufficient understanding of the research types, what is worse, some of the editors could not tell the different of retrospective cohort study, case-control study and cross-sectional study^[11-12]. In this study, Sankey diagrams and violin plots were used to exhibit the data distribution of the CSCD indexed biomedical journals. We could see that Chinese journals account for the highest proportions, the studies types distribution would also be seen. The results showed that cohort study account for the highest proportion, and the key words (retrospective cohort, case-control study or cross-sectional) were most shown both in title and in abstracts. Besides, it was more easily seen in abstracts than in titles of the articles.

The Table 2. showed the incomplete disclosure of information in the articles existed in the CSCD indexed medical journals. STROBE is 22 items guideline which is helpful for the journal to enhance the transparency and to promote the writing quality of the articles^[9-10]. This study combined literature research and the work experience of the author's team to sort out the main content of STROBE using high-quality journals (CSCD indexed) in Shanghai medical journals, analyze the current situation of medical journal application of STROBE guidelines, and propose precautions for medical journal editors when reviewing observational research papers, in order to strengthen the attention and practice of STROBE guidelines by medical journal editors and authors, improve the editing quality of observational research papers and the display of article content, and thereby enhance the connotation quality of the journal.

CSCD indexed journals represents the high quality Chinese journals in China, we could see the articles retrieved and enrolled in this study still has severe problems. Such as the research types were not always clearly described (without clearly labelled whether it is a retrospective cohort, case-control study or cross-sectional), the flowcharts of inclusion and exclusion criteria of the patients are always missing, therefore, we could see that, most Chinese journals have not used STROBE to guide their writing or editing.

4.2 | Status of STROBE Guidelines and the improving strategy

This study found that the main issues existed in the articles contains but not confined in the following aspects: 1) The title or abstract does not specify the type of research. 2) Mis-use of research types, retrospective cohort study is sometimes mis-considered as case-control study. 3) Statistical analysis issues. In some articles, the continuous quantitative data conforms to a normal distribution through normality testing and the variance is homogeneous, Student's *t*-test is used. If the variance is heterogeneous, Welch's *t*-test is used; If it does not conform to the normal distribution, non-parametric test, such as Wilcoxon rank-sum test is used. Correlation analysis, Pearson vs Spearman correlation coefficient test sometimes are incorrectly used. Besides, 95% CI needs to be clarified. 4) Flowchart is always missing in the article. 5) Bias analysis, limitation analysis are always not included in the article, which is also important to the retrospective study.

Strictly following STROBE items for writing or editing is beneficial for improving the writing quality and scientific rigor of a manuscript^[13-14]. Observational studies, in addition to strictly following the STROBE guidelines, editors should require authors to specify the type of study, whether it is a cross-sectional study, case-control study, or retrospective cohort study, and make it clear in the title and the abstract. In addition, detailed explanations of the collection location, time, inclusion criteria, and exclusion criteria for clinical data should be provided in the abstract and body of the study. In spite of these methods, other strategies should be carried out: 1) Correctly use the statistical test; 2) Flowcharts of inclusion and exclusion criteria of the patients in the results is necessary, and should be placed in the result part other than in the method; 3) Bias analysis and limitation illustration. In the future study, more details from larger abundant articles of retrospective study might be analyzed comparing to STROBE checklist by means of artificial intelligence (AI) tools (Large Language Model) to accelerate the key words extraction.

Besides, we should notice that, although STROBE checklist demands the authors to describe which type of retrospective study (retrospective cohort study, case-control study or cross-sectional). But as the cohort contains retrospective study and perspective cohort study, therefore, "retrospective cohort" should be used instead of cohort in demonstrating the type of the research either in title or in the abstract, so that we would not get confused these two types of cohort study.

5 | Limitations of this study

However, this study still has the following limitations: 1) The number of retrospective articles published in biomedical journals included in this study is definitely small, and might induce the result statistical bias, larger sample analysis is needed in the future. 2) More non-CSCD indexed biomedical journals should be analyzed the application status of STROBE according to the STROBE checklist. 3) Bias analysis was not practiced in this study, such as publication bias; it needs to be done in the further study.

6 | Conclusion

In recent years, the medical journals in China paid more attention to international database indexing and the scientific rigor promoting. Therefore, using guidelines from EQUATOR Network is liable to improve the scientific quality of the journals. STROBE is helpful for writing and editing the manuscripts of retrospective studies, in spite of a long way to publicize this guideline. This study investigated the application of STROBE by CSCD-indexed medical journals in Shanghai, investigated the problems existed in these journals and provided the method to solve these problems, hoping to provide reference for writers and editors in using STROBE.

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Ethical Statement

This study does not contain any studies with human or animal subjects performed by any of the authors.

Conflicts of Interest

The authors declare that they have no conflicts of interest to this work.

Author Contribution Statement

Linhui Wang: Conceptualization, methodology, funding, database retrieving, writing-original draft and editing the final draft. Yiren Zhang, equally important and almost the same work as Linhui Wang to this article. Xiaohui Qin: The same contribution as the former two authors, proof-reading and data-analysis, data analysis (CSCD vs CNKI/sinoMed). Ming Ni: Statistical analysis, review & editing. Guangtao Li & Hong Xu, retrieving data from CNKI and Chinese Medical Journal Network and data analyzing, proof-reading. Xiaowen Li: Database retrieving of PubMed, WoS, sinoMed, writing-original draft, review.

Data Availability Statement

Not applicable.

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