Adherence to the Strengthening the Reporting of Observational Studies in Epidemiology Statement in Observational Studies Published in Iranian Medical Journals

Soheila SHAGHAGHIAN, *Behrooz ASTANEH

Department of Medical Journalism, School of Paramedical Sciences, Shiraz University of Medical Sciences, Shiraz, Iran

*Corresponding Author: Email: astanehb@yahoo.com

(Received 10 May 2019; accepted 21 Jul 2019)

Abstract

Background: Although much medical knowledge comes from observational research, such studies are more prone to confounding and bias than others. This study was conducted to evaluate the adherence of the observational studies published in Iranian medical journals to the STROBE (strengthening the reporting of observational studies in epidemiology) statement.

Methods: In this cross-sectional study, we selected 150 articles of Iranian medical journals, using multistage sampling from Aug 2016 to Jun 2017. The reported items of the STROBE statement in the articles was determined and considered as the adherence of the articles to the statement. The adherence of the articles with different characteristics was compared.

Results: The adherence of the articles to the statement varied from 24% to 68% with a mean score of 48%±9%. The lowest mean scores were found in the Result (36%) and Method (49%) sections. The adherence was significantly better in the articles published in the journals indexed in PubMed or Web of Knowledge (ISI) databases (P<0.001) and those written by cooperation of the authors from other countries (P=0.044).

Conclusion: The evaluated articles in our study had not adequately reported the items recommended by the STROBE statement. This indicates deficiency in key elements for readers to assess the validity and applicability of a study.

Keywords: Iran; Journal; Observational study; Quality; Strengthening the reporting of observational studies in epidemiology (STROBE)

Introduction

To optimally manage patients, health care workers need to find all aspects of diseases by researching. Although randomized clinical trials (RCTs) are the most valuable studies, much of health knowledge comes from observational studies (1). Yet, observational studies are more prone to bias because, in them, patients do not perceive risks by random assignment (2). Therefore, readers will find high-quality observational studies, only if researchers present all processes and results of their studies clearly (3).

Nevertheless, observational studies usually were not reported completely (4). Therefore, a group of methodologists, researchers, and editors released Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement in 2007 (5). The statement recommended a clear description of what was designed, conducted, and found in the studies (1).

Up to now, several studies evaluated the adherence of different kinds of observational studies, case-control (6), cross-sectional (7), and cohort
Adherence to the Strengthening the Reporting of Observational (8), to the STROBE statement. The studies published in a specific journal (9) or presented in a congress (10) were also evaluated. However, researchers did not find a good quality in their reporting. Moreover, it was shown that although the quality improved over time, it was not affected by the release of the statement (11).

In recent years, many medical journals have been established in Iran (12); however, the quality of the articles published in the journals is dubious. Evaluating the adherence of the RCTs published in Iranian medical journals to the CONSORT statement, Sarveravan and others found a very weak adherence (13). However, to the best of our knowledge, no research has evaluated the quality of observational studies published in Iran. Identification of shortcomings of the articles can help to establish movements toward standardized reporting. Therefore, we evaluated the adherence of the observational studies and their subsections to the STROBE statement. Furthermore, the associated factors of the adherence such as the language and publication year of the articles were assessed.

Materials and Methods

In this cross-sectional study, conducted from Aug 2016 to Jun 2017, we evaluated the articles published in Iranian medical journals from 2015 to 2017. The evaluated articles were the observational studies published in Iranian medical journals ranked as "scientific" by "Iranian Commission for Accreditation of Medical Journals" affiliated to Iranian Ministry of Health and Medical Education. We found the name of 352 scientific medical journals on the webpage of the Iranian Commission in Aug 2016. Of them, 70 journals were indexed in PubMed or Web of Knowledge databases (historically called as Institute for Scientific Information [ISI]). The others consisted of 132 English language and 150 Persian language journals (12).

Considering $\alpha=5\%$, power=80$, and estimated effect size=40$, we calculated the sample size, which was 44 for each group; PubMed/ISI indexed journals, and English language and Persian language non-PubMed/ISI indexed ones. However, we evaluated 150 articles; 50 from each group.

We selected the articles, using multistage sampling. The first stage was stratified random sampling. To do the sampling, we entered the name of all the Iranian medical journals to the SPSS software and randomly selected 10 journals from each group. However, some selected journals were excluded because:

- No observational studies were published in them in 2015, 2016, and 2017.
- Their publication was stopped before 2015.
- The journals were Persian language according to the Iranian Commission list but at the time of our evaluation, their language was English.

To replace the excluded journals, we again randomly selected journals from the list, using SPSS software (Chicago, IL, USA). In the second stage, we selected the latest five observational articles of each selected journal, using convenience sampling.

Reading the selected articles, we excluded the articles that their study types were not truly labeled.

Data were collected by using researcher-made checklists consisting of two parts. The first part was about descriptive characteristics of the articles including indexing in PubMed/ISI, and their language, publication year and authors' affiliation. The second part consisted of items evaluating the adherence of the articles to the statement.

Although the STROBE statement has 22 items, there are several subcategories in some of the items. We designed the checklists consisting of all the subcategories. The statement explains about reporting of the three main types of observational studies; therefore, we designed three checklists; 57-item, 56-item, and 53-item checklists for evaluating cohort, case-control, and cross-sectional studies, respectively.

A researcher evaluated all the selected articles, considering the explanation and elaboration of the items (1). However, to calibrate the researcher, 10 articles were evaluated by a team consisting of four faculty members of Shiraz University of Medical
Sciences (SUMS). The team members excluded one item, “Describe any efforts to address potential sources of bias”, from the checklists. To enhance the validity of the research, the researcher consulted with epidemiologists and statisticians whenever it was necessary.

To score the conformity of the article to each item of the checklists, the researcher marked the conformed, partially conformed, and non-conformed items as 1, 0.5, and 0, respectively. Moreover, the non-applicable items were considered as missing and to adjust the effect of them, we divided the summation of the scores of each article by the total number of its applicable items. Afterward, the score of each article was calculated based on the total score of 100. Using the same method, each section of the articles was also scored between 0 and 100.

The collected data were analyzed using SPSS software (ver.18, Chicago, IL, USA). The adherence of the articles to the statement was reported by mean (±SD).

To evaluate the effect of partially conforming items, we conducted a sensitivity analysis, using two scoring systems. The partially conforming items were analyzed similar to non-conforming and conforming items, scored 0 and 1, in the first and second scoring system, respectively. The mean scores of the articles in each scoring system were calculated and considered as the worst and the best scores that the article adherence might be taken.

We compared the adherence of the articles in different groups, using independent sample t-test, and one-way analysis of variance (ANOVA) with Tukey’s HSD for multiple comparisons. To control the effect of possible confounding factors, we entered all the article characteristics into a multiple regression model with adherence of the articles to the statement as dependent variable.

The study was approved by the Research Ethics Committee of SUMS. To consider ethical issue, the score of each evaluated journal was confidential.

Results

Of the 30 primarily selected journals, 12 were excluded and replaced; five PubMed/ISI indexed, and four English and three Persian-language non-PubMed/ISI indexed ones. To select 150 articles, we evaluated 173 observational articles; 23 were excluded because their study types were not truly labeled (Fig.1).

Of the evaluated articles, the study design in 124 (82.7%), 21 (14%), and 5 (3.3%) were cross-sectional, case-control, and cohort, respectively. Most of them (70%) were published in 2016 (Table 1).

| Characteristics of the articles | N (%) | Adherence (%) | P-value | β | P-value |
|---------------------------------|-------|---------------|---------|---|---------|
| Language                        |       |               |         |   |         |
| -English                        | 100 (66.7) | 49±9           | 0.018*  | -0.004 | 0.834   |
| -Persian                        | 50 (33.3)  | 45±9           |         | - |         |
| Indexed in                      |       |               |         |   |         |
| -PubMed/ISI                     | 50 (33.3)  | 52±8           | <0.001* | 0.072 | <0.001 |
| -Other databases                | 100 (66.7) | 45±9           |         | - |         |
| Publication year†               |       |               |         |   |         |
| -2015                           | 13 (8.7)   | 42±7           | 0.028** | - |         |
| -2016                           | 105 (70.0) | 49±9           |         | 0.043 | 0.098   |
| -2017                           | 32 (21.3)  | 46±10          |         | 0.042 | 0.149   |
| Authors’ affiliation            |       |               |         |   |         |
| -Iran                           | 119 (79.3)| 47±9           | 0.061*  | - |         |
| -Iran & other countries         | 7 (4.7)    | 54±11          |         | 0.069 | 0.044   |
| -No Iran                        | 24 (16.0)  | 50±9           |         | <0.001| 0.966   |

ISI: Institute of scientific information // N: Number // SD: Standard Deviation
* Independent sample T-test // ** One Way ANOVA
† Different letters show statistically significant differences.
The percentage of the articles conforming to each item of the statement is shown in Table 2. Some important points had been reported only by a few articles. Only 20.7%, 5.3%, and 3.3% of the articles had reported sample size calculations, number of the participants with missing data, and the generalizability (external validity) of the study, respectively.

Available at: http://ijph.tums.ac.ir
Table 2: Adherence of the articles published in Iranian medical journals to the STROBE statement (N=150)

| Article part | Items of the STROBE statement checklist | Conforming | Partially con-forming | Non-con-forming | Non-applicable |
|--------------|----------------------------------------|------------|-----------------------|------------------|----------------|
| Title & abstract | Indicate the study's design in the title or the abstract | 88 (58.7) | 2 (1.3) | 60 (40.0) | 0 (0.0) |
|  | An informative and balanced abstract | 67 (44.7) | 82 (54.7) | 1 (0.7) | 0 (0.0) |
| Introduction | Explain the scientific background of the investigation | 118 (78.7) | 28 (18.7) | 4 (2.7) | 0 (0.0) |
|  | Explain the rationale for the investigation being reported | 92 (61.3) | 51 (34.0) | 7 (4.7) | 0 (0.0) |
|  | State the goal of the study | 114 (76.0) | 30 (20.0) | 6 (4.0) | 0 (0.0) |
|  | State specific objectives or pre-specified hypotheses | 19 (12.7) | 12 (8.0) | 112 (74.7) | 7 (4.7) |
| Study design: | Present study design early in the paper | 92 (61.3) | 1 (0.7) | 57 (38.0) | 0 (0.0) |
| Setting: | Describe the setting and locations of the study | 124 (82.7) | 8 (5.3) | 18 (12.0) | 0 (0.0) |
|  | Describe the period of recruitment and data collection | 94 (62.7) | 3 (2.0) | 53 (35.3) | 0 (0.0) |
|  | Describe the period of exposure | 9 (6.0) | 1 (0.7) | 6 (4.0) | 134 (89.3) |
|  | Describe the period of follow-up | 8 (5.3) | 0 (0.0) | 4 (2.7) | 138 (92.0) |
| Participants: | Give the Inclusion criteria of participants | 104 (69.3) | 13 (8.7) | 33 (22.0) | 0 (0.0) |
|  | Give the source population of participants | 127 (84.7) | 11 (7.3) | 12 (8.0) | 0 (0.0) |
|  | Give methods of selection of participants (sampling) | 86 (57.3) | 20 (13.3) | 44 (29.3) | 0 (0.0) |
|  | Give methods of follow-up (only for cohort studies, N=5) | 1 (20.0) | 0 (0.0) | 2 (40.0) | 2 (40.0) |
|  | Give the rationale for the choice of cases and controls (for case-control studies, N=21) | 3 (14.3) | 1 (4.8) | 13 (61.9) | 4 (19.0) |
|  | For matched studies, give matching criteria (for cohort and case-control studies, N=26) | 7 (26.9) | 1 (3.8) | 2 (7.7) | 16 (61.6) |
|  | For matched studies, give number of controls per case (for case-control studies, N=21) | 4 (19.0) | 0 (0.0) | 6 (28.6) | 11 (52.4) |
|  | For matched studies, give number of exposed and unexposed (for cohort studies, N=5) | 1 (20.0) | 0 (0.0) | 0 (0.0) | 4 (80.0) |
| Methods | Define all outcomes | 124 (82.7) | 12 (8.0) | 13 (8.7) | 1 (0.7) |
|  | Define all exposures | 88 (58.7) | 20 (13.3) | 31 (20.7) | 11 (7.3) |
|  | Define all potential confounders | 31 (20.7) | 9 (6.0) | 99 (66.0) | 11 (7.3) |
|  | Define all effect modifiers | 0 (0.0) | 0 (0.0) | 143 (95.3) | 7 (4.7) |
|  | Give methods of measurement | 118 (78.7) | 17 (11.3) | 15 (10.0) | 0 (0.0) |
|  | Give sources of data for methods of measurement | 86 (57.3) | 16 (10.7) | 43 (28.7) | 5 (3.3) |
|  | Describe comparability of measurement methods between two groups | 7 (4.7) | 1 (0.7) | 28 (18.7) | 114 (76.0) |
| Bias: | Describe any efforts to address potential sources of bias | - | - | - | - |
| Study size: | Report of sample size calculations | 31 (20.7) | 5 (3.3) | 113 (75.3) | 1 (0.7) |
| Quantitative variables: | Description about groupings chosen for quantitative variables | 49 (32.7) | 2 (1.3) | 29 (19.3) | 70 (46.7) |
|  | Description about why the groupings chosen for quantitative variables | 24 (16.0) | 4 (2.7) | 50 (33.3) | 72 (48.0) |
| Statistical methods: | Description of unadjusted statistical methods | 132 (88.0) | 0 (0.0) | 9 (6.0) | 9 (6.0) |
|  | Description of the statistical methods used to control for confounding | 62 (41.3) | 0 (0.0) | 79 (52.7) | 9 (6.0) |
| Description of statistical methods used to examine subgroups and interactions | 0 (0.0) | 0 (0.0) | 143 (95.3) | 7 (4.7) |
| Description of how missing data were addressed | 0 (0.0) | 0 (0.0) | 150 (100.0) | 0 (0.0) |
| Explanation about how loss to follow-up was addressed (cohort studies, N=5) | 0 (0.0) | 0 (0.0) | 5 (100.0) | 0 (0.0) |
| Explanation about how matching of cases and controls was addressed (only case-control studies, N=21) | 0 (0.0) | 0 (0.0) | 11 (52.4) | 10 (47.6) |
| Describe analytical methods taking account of sampling strategy (cross sectional studies, N=124) | 0 (0.0) | 0 (0.0) | 123 (99.2) | 1 (0.8) |
| Description about any sensitivity analyses | 1 (0.7) | 0 (0.0) | 148 (98.7) | 1 (0.7) |

### Participants:

- Report numbers of individuals eligible for the study: 10 (6.7) 1 (0.7) 139 (92.7) 0 (0.0)
- Report numbers of individuals included in the study: 89 (59.3) 0 (0.0) 61 (40.7) 0 (0.0)
- Give reasons for non-participation at each stage: 4 (2.7) 5 (3.3) 140 (93.3) 1 (0.7)
- Use of a flow diagram for showing participants: 0 (0.0) 0 (0.0) 149 (99.3) 1 (0.7)

### Descriptive data:

- Give characteristics of study participants: 103 (68.7) 19 (12.7) 28 (18.7) 0 (0.0)
- Give information on exposures: 105 (70.0) 16 (10.7) 19 (12.7) 10 (6.7)
- Give information on potential confounders: 41 (27.3) 7 (4.7) 93 (62.0) 9 (6.0)
- Indicate number of participants with missing data for each variable of interest: 8 (5.3) 1 (0.7) 141 (94.0) 0 (0.0)
- Summarize follow-up time (only for cohort studies, N=5): 3 (60.0) 0 (0.0) 2 (40.0) 0 (0.0)

### Outcome data:

- Report numbers of outcome events or summary measures over time (only cohort studies, N=5): 5 (100.0) 0 (0.0) 0 (0.0) 0 (0.0)
- Report numbers in each exposure category (only case-control studies, N=21): 18 (85.7) 2 (9.5) 1 (4.8) 0 (0.0)
- Report numbers of outcome events or summary measures (only cross sectional studies, N=124): 109 (87.9) 2 (1.6) 12 (9.7) 1 (0.8)

### Main results:

- Give unadjusted estimates and their precision: 125 (83.3) 13 (8.7) 1 (0.7) 11 (7.3)
- Give confounder-adjusted estimates and their precision: 56 (37.3) 3 (2.0) 82 (54.7) 9 (6.0)
- Make clear which confounders were adjusted for: 48 (32.0) 2 (1.3) 91 (60.7) 9 (6.0)
- Make clear why the confounders were included: 5 (3.3) 0 (0.0) 136 (90.7) 9 (6.0)
- Report category boundaries when continuous variables were categorized: 46 (30.7) 9 (6.0) 26 (17.3) 69 (46.0)
- Consider translating estimates of relative risk into absolute risk: 0 (0.0) 0 (0.0) 0 (0.0) 150 (100)

### Other analyses:

- Report analyses of subgroups and interaction: 1 (0.7) 1 (0.7) 141 (94.0) 7 (4.7)
- Report sensitivity analyses: 2 (1.3) 0 (0.0) 148 (98.7) 0 (0.0)

### Discussion

- Key results: 66 (44.0) 23 (15.3) 61 (40.7) 0 (0.0)
- Limitations: 81 (54.0) 9 (6.0) 60 (40.0) 0 (0.0)
- Interpretation: 132 (88.0) 13 (8.7) 5 (3.3) 0 (0.0)
- Generalizability: 5 (3.3) 0 (0.0) 145 (96.7) 0 (0.0)

### Other information:

- Funding: 81 (54.0) 7 (4.7) 62 (41.3) 0 (0.0)

Of some items, although some subcategories had been mentioned in acceptable proportion of the articles, other subcategories had been reported by a few ones. While 32.7% of the articles had described "groupings chosen for quantitative variables", only 16.0% had described about "why the
groupings were chosen for them”. Although the goal of study had been stated in 76.0%, the specific objectives had been stated only in 12.7%. Similarly, 88.0% and 41.3% of the articles had described the used unadjusted, and confounder adjusted statistical analysis in the Method, respectively. However, no articles had reported the statistical methods used to examine subgroups and interactions; to control the effect of sampling strategy; and to describe how missing data, loss to follow-up, and matching of cases and controls were addressed. Furthermore, only one article had described sensitivity analysis. Likewise, in result section, 83.3%, and 37.3% had reported unadjusted and confounder-adjusted analysis but only 3.3% had made clear why the confounders were included. In addition, only 1, and 2 studies had reported analyses of subgroups and interaction, and sensitivity analysis, respectively (Table 2).

The adherence score of each evaluated article varied from 24% to 68% (Mean±SD: 48%±9%). Comparing the means of the article sections, we found the least and the highest score in Result and Introduction, respectively (Fig. 2).

The means of the articles calculated in the sensitivity analysis were very close to the calculated mean. The best and worst means were 45%±10% and 51%±9%, respectively. In univariate analysis, the adherence of the articles was significantly associated with their language ($P=0.018$) and publication year ($P=0.028$), and whether they indexed in PubMed/ISI or not ($P<0.001$). In multiple regression analysis, the adherence of the articles published in PubMed/ISI indexed journals was significantly better than the others ($P<0.001$). In contrast, the adherence was not significantly associated with their language and publication year. Furthermore, the articles whose authors were affiliated with two or several countries including Iran had more adherence than the ones whose authors’ affiliation was only Iran ($P=0.044$, Table 1).
Discussion

This study assessed the adherence of the observational studies published in Iranian medical journals to the STROBE statement and the factors associated with the adherence. Our result showed a large proportion of unreported STROBE items in the articles. Furthermore, the adherence was significantly better in multicenter studies and in the articles published in PubMed/ISI indexed journals. The evaluated articles in our study, similar to the ones in other studies (2, 6, 14, 15) had reported averagely half of the items recommended by the statement. This highlighted a clear need to improve the quality of the reporting.

Although Method and Result are the most important parts of articles, our study, similar to another study (7), showed the least adherence in the sections. Unclear presentation of what was done and found can lead to difficult interpretation of studies and should be prevented. Sample size is the most important factor to determine the statistical power of a research. Nevertheless, our results, similar to other studies (3, 15-17) showed poor reporting of sample size calculations. Therefore, authors and scientists should be trained to report not only the number of participants but also the process of calculating the number.

Missing data can influence the generalizability of the study or cause biases. Yet, in the evaluated articles in our study and other studies (3, 15-18) the participants excluded from research had rarely been reported. Furthermore, there was not a significant improvement in the reporting of this item after establishment of the STROBE (16).

According to the STROBE, investigators should explain not only "which groupings were chosen for quantitative variables" but also "why the groupings were chosen". However, in our study, only a few number of the articles had described the reason. Because the articles published after establishment of the statement significantly reported the item better (16), adequate introduction of the statement can improve its reporting.

Objectives are the detailed aims of the study and should be stated in Introduction (1). Nevertheless, in our study, similar to other studies (3, 16), objectives were stated only in a few ones although the goal of the study was stated in much of the articles. Statistical analysis should be clearly described in Method and reported in Result. If both unadjusted and confounder-adjusted analyses are reported, readers will be able to judge by how much, and in what direction, potential confounders change effect estimate (2). In addition, the reason that the confounders were included in the adjusted analyses is so important because defining associations between various data depend not only on the data but also on the design of the study. Furthermore, the analyses of subgroups and interactions and sensitivity analyses should be reported to display potential interaction between risk factors, and to estimate the probable range of variation in outcome. However, in our study, similar to other studies (3, 7, 15, 17, 19), only few articles reported the analyses.

In our study, the articles that their authors were from two or several countries including Iran were more conformed to the statement than those whose authors were only from Iran. The result highlighted the importance of designing large and multicenter studies with contribution of the authors from different countries.

Our study, similar to other studies (20), showed that the articles published in PubMed/ISI indexed journals were significantly more conformed to the statement. Yet, in our study and other studies (19, 20), the conformity was not satisfactory even in the articles published in PubMed/ISI indexed journals. Therefore, improving the quality of all articles, including those published in PubMed/ISI indexed journals is necessary.

To improve the quality of observational studies, we suggest the following recommendations:

- Increasing the awareness of researchers and editors about the importance of reporting articles compatible with the STROBE
- Establishing workshops for training of researchers to write their articles compatible to the statement
• Endorsing the statement in the instructions for authors of journals
• Requiring authors to submit a checklist with sufficient text excerpted from the manuscript to explain how they accomplished all applicable items of the statement
• Considering the statement in the review process of articles

Despite our great efforts to conduct a well-designed study, this study had some limitations. The most important was the subjective nature of the scoring. To decrease the extent of the problem, the evaluation of all articles was conducted by one of the researchers, a medical doctor expert in epidemiology and statistics.

The second limitation was about the scoring of the partially conformed items. While all the items received the same score, they had different degrees of conformation. To show the extent of such problem, we conducted a sensitivity analysis. However, the best and worst means in the analysis were very close to the previously calculated mean. Therefore, the effect of the items was ignorable.

Another limitation was the same scoring of all the items of the statement while they did not have the same weight in terms of their effect on the validity of articles. The next limitation occurred because it was impossible to blind the researcher evaluating the articles to the name of authors or journals. However, the researcher did not have any competing interest to the evaluated articles. Furthermore, because the evaluated articles were not graded in one sitting, the effects of grading variability or grader fatigue might occur.

**Conclusion**

Compliance with the STROBE statement substantially increases the quality of reporting observational studies. However, our study shows low compliance of the observational studies published in Iranian Medical journals to the statement in many items, especially those related to Result and Method. Interventional programs should be established to improve the situation.

**Ethical considerations**

Ethical issues (including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

**Acknowledgements**

The authors thank the Vice-chancellery for Research of SUMS for financial support of the research (Grant#9513). In addition, we would like to thank Mr. Mehrab Sayyadi and Dr. Hale Ghaem, who replied to our statistical and epidemiologic consultations patiently. This manuscript is based on the thesis of Dr. Soheila Shaghaghian.

**Conflict of interest**

The authors declare that there is no conflict of interest.

**References**

1. Vandenbroucke JP, von Elm E, Altman DG et al (2007). Strengthening the Reporting of Observational Studies in Epidemiology (STROBE): explanation and elaboration. *Epidemiology*, 18 (6):805-35.
2. Pouwels KB, Widyakusuma NN, Groenwold RH et al (2016). Quality of reporting of confounding remained suboptimal after the STROBE guideline. *J Clin Epidemiol*, 69:217-24.
3. Kim MR, Kim MY, Kim SY et al (2012). The quality of reporting of cohort, case-control studies in the korean journal of family medicine. *Korean J Fam Med*, 33 (2):79-88.
4. Pocock SJ, Collier TJ, Dandreo KJ et al (2004). Issues in the reporting of epidemiological studies: a survey of recent practice. *BMJ*, 329 (7471):883.
5. Von Elm E, Altman DG, Egger M et al (2008). The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting
 observational studies. J Clin Epidemiol, (4):344-9.
6. Goi PD, Goi JD, Cordini KL et al (2014). Evaluating psychiatric case-control studies using the STROBE (STrengthening the Reporting of OBservational Studies in Epidemiology) statement. Sao Paulo Med J, 132 (3): 178-83.
7. Tapia JC, Ruiz EF, Ponce OJ et al (2015). Weaknesses in the reporting of cross-sectional studies according to the STROBE statement: the case of metabolic syndrome in adults from Peru. Sao Paulo Med J (Cali), 46 (4): 168-75.
8. Poorolajal J, Cheraghi Z, Irani AD et al (2011). Quality of Cohort Studies Reporting Post the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement. Epidemiol Health, 33: e2011005.
9. Lee JH (2014). Addressing the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement in Archives of Plastic Surgery Reports. Arch Plast Surg, 41 (1): 1-2.
10. Hashabceci M, Basak F, Uysal O (2014). Evaluation of reporting quality of the 2010 and 2012 National Surgical Congress oral presentations by CONSORT, STROBE and Timmer criteria. Ulas Cerrahi Derg, 30 (3): 138-46.
11. Bastuji-Garin S, Shidian E, Gaudy-Marqueste C et al (2013). Impact of STROBE statement publication on quality of observational study reporting: interrupted time series versus before-after analysis. PLoS One, 8 (8): e64733.
12. Iranian Medical Journals [internet]. Ministry of Health and Medical Education; Available from: https://journals.research.ac.ir/ Accessed 12 June, 2016.
13. Sarveravan P, Astaneh B, Shokrpour N (2017). Adherence to the CONSORT Statement in the Reporting of Randomized Controlled Trials on Pharmacological Interventions Published in Iranian Medical Journals. Iran J Med Sci, 42 (6): 532-43.
14. Parsons NR, Hiskens R, Price CL et al (2011). A systematic survey of the quality of research reporting in general orthopaedic journals. J Bone Joint Surg Br, 93 (9): 1154-9.
15. Serrano M, Gonzalvo MC, Sanchez-Pozo MC et al (2014). Adherence to reporting guidelines in observational studies concerning exposure to persistent organic pollutants and effects on semen parameters. Hum Reprod, 29 (6): 1122-33.
16. Rao A, Bruck K, Methven S et al (2016). Quality of Reporting and Study Design of CKD Cohort Studies Assessing Mortality in the Elderly Before and After STROBE: A Systematic Review. PLoS One, 11 (5): e0155078.
17. Fung AE, Palanki R, Bakri SJ et al (2009). Applying the CONSORT and STROBE statements to evaluate the reporting quality of neovascular age-related macular degeneration studies. Ophthalmology, 116 (2): 286-96.
18. Delaney M, Meyer E, Cserti-Gazdewich C et al (2010). A systematic assessment of the quality of reporting for platelet transfusion studies. Transfusion, 50 (10): 2135-44.
19. Hendriksma M, Joosten MH, Peters JP et al (2017). Evaluation of the Quality of Reporting of Observational Studies in Otorhinolaryngology-Based on the STROBE Statement. PLoS One, 12 (1): e0169316.
20. Tacconelli E, Cataldo MA, Paul M et al (2016). STROBE-AMS: recommendations to optimise reporting of epidemiological studies on antimicrobial resistance and informing improvement in antimicrobial stewardship. BMJ Open, 6 (2): e010134.

Available at: http://ijph.tums.ac.ir