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Health Scope
Article DOI: 10.5812/jhealthscope.97184
Published in: Health Scope: 9(2); e97184

Peer Review Report for "A Quantitative Index to Rank and Select Electromagnetic Shields in Radiofrequency and Microwave Radiation"

Author(s): Vida Zaroushani, Farahnaz Khajehnasiri

Review Timeline:

Submit Date: 14 Aug 2019
Revised Date: 26 Jan 2020
Accepted Date: 16 Feb 2020

Revision (0)

Here, you can see the **Reviewers**, **Associate Editors** and **EICs'** comments from the beginning to the end of the revision process.

REFEREE: Reviewer | Revision (0)

12 Oct 2019

Dear AE,
1- There is insufficient justification in the introduction regarding this work. What are the differences between the current study and previous studies?
2- The authors have not mentioned the type of study
3- The authors should explain why the arithmetic men have been calculated in this model
4- The explanation regarding the considered instrument is not enough. How have the authors approved the reliability and validity?
5- The discussion is poor. The results should be compared with the results of previous studies
Thanks.

REFEREE: Reviewer | Revision (0)

13 Oct 2019

Dear AE,
Thank you for the opportunity to review “A Quantitative Rating Index to classification of Electromagnetic Shields in Radio frequency and Microwave Radiation” After careful

consideration I would recommend the paper be severe revised and rechecked. My rationale is based on the comments below:
1. The real aspects are not clearly outlined in the objectives and conclusion
2. References provided in the Materials and Methods section have no relevance to the method used, in particular, Reference 22,23
3. The methods ,discussion and conclusions sections were written too hastily. The discussions are not instructive and poorly organized.There is little invaluable information in the paper
4. The abstract poorly organized as is needed to rewrite again.
5. .In the Materials and methods, more detailed description on the sampling procedure is required.
6. Although the selected topic is very important but I think there is lack of details in manuscript. In the other word manuscript text is not complete in the line of defined objectives. I encourage the authors to continue to develop/her research.
Thanks.

REFEREE: Associate Editor | **Revision** (0) 26 Oct 2019

Dear EIC,
The manuscript is studied, and there are some comments which should be addressed by the author. According to the comments, the document needs major revision.
Kind regards,

Ramazan Mirzaei: EIC | **Revision** (0) 28 Oct 2019

Dear Author,
Your article is reviewed by the reviewers carefully. According to their comments, this document needs major revision. Please follow their comments as requested.
Thanks.

OPEN PEER REVIEW

Revision (1)

Reply to Reviewers

Ideally, the reviewing process can significantly improve the submitted manuscripts by allowing the authors to take into account the advice of reviewers. Author(s) must reply to all reviewers' comments in a separate Word file, point by point. A "**Reply to Reviewers**" document is submitted along with revised manuscript during submission of revised files, summarizing the changes that the authors made in response to the reviewers' comments. The responses to reviewers' comments specifies how the authors addressed each comment the reviewers made.

You can read the authors' responses to the reviewers' comments in the next page.

Dear editor

We are very much thankful to the reviewers for their deep and thorough review. We have revised our present research paper (ID: 97184) in the light of their useful suggestions and comments (implemented revise were showed by green highlight). We hope our revision has improved the paper to a level of their satisfaction.

It is noticeable that the explanation given on the English editing is not related to this manuscript and relevant to another manuscript entitled "Checklist for Cognitive Characteristics of Driving Scripts" .However, our manuscript with ID 97184 was also edited in English. In the end, it is hoped that the reforms carried out will be approved by respected editor and reviewers.

With best regards

Dr. Vida Zaroushani

OPEN PEER REVIEW

Revision (1)

Here, you can see the **Reviewers**, **Associate Editors** and **EICs'** comments from the beginning to the end of the revision process.

REFEREE: Reviewer | **Revision** (1) 13 Dec 2019

Dear AE,
The respected authors should also submit the replies along with the reviewers' comments.
Thanks.

REFEREE: Reviewer | **Revision** (1) 22 Dec 2019

Dear AE,
The study is reviewed carefully. According to comments and revisions by the author, this manuscript is accepted.
Thanks

REFEREE: Associate Editor | **Revision** (1) 23 Dec 2019

Dear EIC
The reviewer(s) have recommended publication, but also suggest some minor revisions to the manuscript. Therefore, I invite the author to respond to the reviewer(s)' comments and revise his manuscript.
Kind regards,

REFEREE: EIC | **Revision** (1) 24 Dec 2019

Dear Author,
Your article is reviewed by the reviewers carefully. According to their comments, this document needs minor revision. Please follow their comments as requested.
Thanks.

OPEN PEER REVIEW

Revision (2)

Reply to Reviewers

Ideally, the reviewing process can significantly improve the submitted manuscripts by allowing the authors to take into account the advice of reviewers. Author(s) must reply to all reviewers' comments in a separate Word file, point by point. A "**Reply to Reviewers**" document is submitted along with revised manuscript during submission of revised files, summarizing the changes that the authors made in response to the reviewers' comments. The responses to reviewers' comments specifies how the authors addressed each comment the reviewers made.

You can read the authors' responses to the reviewers' comments in the next page.

Dear editor

We are very much thankful to the reviewers for their deep and thorough review. We have revised our present research paper (ID: 97184) in the light of their useful suggestions and comments (implemented revise were showed by green highlight). We hope our revision has improved the paper to a level of their satisfaction. The replies along with the reviewers' comments are presents as follows.

It is noticeable that the explanation given on the English editing is not related to this manuscript and relevant to another manuscript entitled "Checklist for Cognitive Characteristics of Driving Scripts" .However, our manuscript with ID 97184 was also edited in English. In the end, it is hoped that the reforms carried out will be approved by respected editor and reviewers.

With best regards

Dr. Vida Zaroushani

Replies along with the reviewers' comments:

Reviewer 1:

1-There is insufficient justification in the introduction regarding to this work. What are the differences of current study and previous studies?

In introduction: ..... Lack of a specific ranking index for choosing protective shields, causes problems in making decisions in radiation safety management .Therefore, the existence of such a method can be useful and benefit in this issue. It is noticeable that some previous studies were reported the selected shields based on the shielding effectiveness (SE) range (18, 19) or maximum shielding effectiveness value at a specific frequency (1, 2, 20, 21) and did not use the determined selecting or ranking method for electromagnetic shields. Furthermore, in other areas of occupational health and safety, there have been various studies with selection and prioritization of some subjects by using the multi-criteria decision making techniques to rank or select the subjects. In this line, Janackovic et al (2013) applied a systematic approach to the analysis of safety indicators. They used the expert evaluation method to select the key occupational safety indicators, and the fuzzy AHP method to rank them(22). Yarahmadi et at (2016) Prioritized the safety and health indicators based on the Fuzzy TOPSIS method with SMART criteria (3). Öztürk et al (2017) an integrated multi-criteria decision making model developed for selection of occupational safety employees(23). In another study, Changizi et al (2017) by using of hierarchical analysis process and Delphi techniques as well as TOPSIS method chooses the best option of health, safety and environmental criteria for the ranking the Ahvaz urban park(6).Asghari et al (2017) Determined and weighted the effective criteria in selecting a heat stress index using the Delphi technique and fuzzy analytic hierarchy process (FAHP) (5) .Nadali Jelokhani et al

(2018) evaluated and ranked the safety risks of Isfahan municipality construction projects using taxonomic techniques and risk breakdown structure approach (7). In another Tabor (2019) Applied the fuzzy TOPSIS method to assess and select a contractor from the point of view of occupational safety management (24). Also, in other topics of occupational safety, various safety indexes were provided that focused on inherently safety assessment / design, hospital safety index and road and airline safety index and etc. (25-30). As be showed by the literature, there were not found the related research on radiation safety index to rank and select the shield or barriers.

2-the authors have not mentioned to the type of study. In the abstract was mentions as: **Study design : A Research Article.**

3-the authors should explain that why the arithmetic men has been calculated in this model

This step is also very important is that the single indicators need to be picked on the basis of several features: analytical soundness, measurability, country coverage, relevance to the phenomenon being measured and related to each other (33-35). According to this, using literature review the related variables to the phenomenon of shielding effectiveness was extracted and confirmed by the experts. As a result of this, four variables that include the arithmetic average, minimum and maximum values of shielding effectiveness as well as standard deviation were considered as quantitative effective variables to construct the ranking index

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4-the explanation regarding the considered instrument is not enough. How have the authors approved the reliability and validity?

In material and method: Validating the index

This step involves index validation. Construct validity is probably the most difficult to establish, as it is concerned with what the construct is ultimately measured. Many variables that are easily ‘observable’ (such as our research) do not present any formidable difficulties to establishing construct validity but, a subjective evaluation could be more challenging. Item analysis provides a means of testing for internal validation. In other words, the index is examined across the item responses that comprise it (37). For this purpose, item analysis was performed to provide the testing for internal validation.

In discussion at page 9 and 10: Other characteristics of this index are validity and reliability. Validity (also most known as Content validity) refers to the extent to which a measure represents facets of a given construct. Content validity concerns determining the suitability of the segmentation variable for a clearly specified domain of interest (37, 44). In our research,

this is done by referring to the literature and trusting the professional and experts. So, in this study, selected variables in constructing the index are extracted from the concept of shielding effectiveness, which were directly measured and cause to make a valid and reliable index (31, 32). This indexes involves the related variable that measure the shielding effectiveness. Moreover, each Item is empirically related to one another that measure the shielding effectiveness(31, 32).

On reliability, as we know, in statistics and psychometrics it is the overall consistency of a measure. A measure has a high reliability if it produces similar results under consistent conditions (37). In our research the testing process was repeated frequently with a group of shields and essentially the same results would be obtained. Therefore, the index is highly reliable with accurate, reproducible, and consistent from one testing occasion to another.

5-the discussion is poor. The results should be compared with the results of previous studies

Electromagnetic shield selection is a challenging task for designers due to non-ionizing radiation safety today. Choosing the right electromagnetic shields in radiofrequency and microwave radiation plays an important role in numerous engineering applications because an inappropriate selection of shield can significantly affect the performance of the final radiation control measures.

The aim of this paper is to propose a tool called the quantitative index for to the classification of electromagnetic shields in radiofrequency and microwave radiation.

As a result of a literature review, it was shown that there were not similar study about electromagnetic or radiation shield and it was a limitation in this work. But, a number of techniques have been conducted to rank or select the issues in the various occupational safety and health topics such as AHP, TOPSIS (6, 7, 22, 24, 38).The analytic hierarchy process (AHP) is one of the most widely-used multi-attribute decision-making (MADM) methods that be used in many different fields as a multi-attribute decision analysis tool with multiple alternatives and criteria. the fuzzy AHP methods are systematic approaches to the alternative selection and justification problem by using the concepts of fuzzy set theory (39). In most last studies, the selection was a complex problem, in which many qualitative attributes (subjective research) must be considered. These kinds of attributes make the evaluation process hard and vague. So, the hierarchy were used mostly in these studies (40, 41).

Instead, the Objective indicators are used in observational and measurable studies that contain the physical quantities. these indicators are mostly a quantitative indicator (31). Many observational and measurable studies were performed in occupational safety and health that lead to index construction

to rank and select the points. In this regard, it can refer to studies that focused on Hospital Safety Index (27) Integrated inherently safety Index (26, 30) Road safety index (28) airline safety index (25) index for chemical process design considering risk analysis and controllability(42) Inherent safety assessment by Process Stream Characteristic Index (PSCI) (43). But, the related studies about the radiation safety or ranking index on the electromagnetic shield were not found.

As regards to our purpose, this work proposes a quantitative index on electromagnetic quantities to rank and select the electromagnetic shields. This index is included several aspects that are important in choosing the best shield to electromagnetic shielding such average, minimum and maximum values of shielding effectiveness as well as standard deviation.

In our research, the quantitative index was implemented on the single and double electromagnetic shields that previously be constructed (tables 1 and 2).

Reviewer 2:
Thank you for the opportunity to review “A Quantitative Rating Index to classification of Electromagnetic Shields in Radio frequency and Microwave Radiation” After careful consideration I would recommend the paper be severe revised and rechecked. My Rationale is based on the comments below:

1. The real aspects are not clearly outlined in the objectives and conclusion.

In abstract:

Objectives: The objective of this study was to construct a simple quantitative index to rank and select the electromagnetic shields in the radio frequency and microwave radiation.

Conclusion: This study presents a simple quantitative index to rank the electromagnetic shields that could be used as a selection tool in the radiation safety management. Moreover, this ranking index has a simple formula that can be calculated easily and quickly in excel software with high accuracy and low cost. In addition, it could be easily incorporated into a user friendly tool for the ease of application. A case study of electromagnetic Nano composite shields was conducted using the Ranking Index, which showed its capability for ranking the shielding performance of studied electromagnetic shields. It also can create a similar scientific literature to report the efficacy of electromagnetic shields and the selection of preferred shields in different research studies. It is recommended to future studies to examine this quantitative index in other frequency ranges.

In manuscript:

Objectives

The objective of this study was to construct a simple quantitative ranking index to rank and select the electromagnetic shields in the radio frequency and microwave radiation. To the best of our knowledge and based on the literature review there was no previous study on selecting or ranking method about electromagnetic shields.

Conclusion

Choosing the right electromagnetic shields in radiofrequency and microwave radiation plays an important role in radiation safety engineering. This study presents a novel quantitative ranking index that simply and easily ranks the electromagnetic shields numerically and quickly with minimal time and cost waste, without any complex software in radiofrequency and microwave radiation. The present quantitative index could be used as a selection and a compassion tool to determine the premier shield field. Also, other intentions like the comparison of various electromagnetic shields, improvement and development of electromagnetic shields and radiation safety planning will be occurred. Moreover, application of this index could create a same literature for informing and clarifying the ranking of the electromagnetic shields with a quantitative tool. This index is included in several aspects that are important in choosing the best shield to electromagnetic shielding such average, minimum and maximum values of shielding effectiveness as well as standard deviation. In this study the selected variables in constructing the index are extracted from the concept of shielding effectiveness. In addition, the testing process was repeated frequently and the same results would be obtained. Therefore, the presented quantitative index has reliability and validity.

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2. References provided in the Materials and Methods section have no relevance to the method used, in particular Reference 22, 23

All references were checked and related correct were done. For example references 22 and 23 were corrected to 31-37.

31. mahvash m, saedvandi m. Indexing and Its Application in Explanation of Islamic Architecture Concepts. scientific journal of Pazhuhesh-e Honar. 2016;6(11):59-73.
32. Wong C. Indicators for Urban and Regional Planning: The Interplay of Policy and Methods: Taylor & Francis; 2004.
33. Santeramo FG. Methodological challenges in building composite indexes: Linking theory to practice. Emerging Trends in the Development and Application of Composite Indicators: IGI Global; 2017. p. 127-39. DOI: 10.4018/978-1-5225-0714-7.ch006
34. Union E, Commission JRCE. Handbook on Constructing Composite Indicators: Methodology and User Guide: OECD Publishing; 2008.
35. Hiremath RB, Balachandra P, Kumar B, Bansode SS, Murali J. Indicator-based urban sustainability—A review. Energy Sustain Dev. 2013;17(6):555-563. DOI: 10.1016/j.esd.2013.08.004
36. Jiang D, Murugadoss V, Wang Y, Lin J, Ding T, Wang Z, Shao Q, Wang C, Liu H, Lu N. Electromagnetic interference shielding polymers and nanocomposites-a review. Polym Rev. 2019;59(2):280-337. https://**DOI**.org/10.1080/15583724.2018.1546737
37. Van Zyl D, Puth G. Constructing a sophistication index as a method of market segmentation of commercial farming businesses in South Africa. Southern African Business Review. 2015;19(2):99-117. **DOI**: 10.25159/1998-8125/5908

3. The methods, discussion and conclusions sections were written too hastily. The discussions are not instructive and poorly organized. There is little invaluable information in the paper

These section were corrected and remarked by green highlight in the manuscript.

4. The abstract poorly organized as is needed to rewrite again.

The abstract rewrite again as follows:

Abstract

Background : In electromagnetic shielding topics, selection of suitable shields is an important subject and lack of a specific ranking index for choosing protective shields, causes problem in decision making. So, this study proposes a quantitative index to rank and select the electromagnetic shields in the radio frequency and microwave radiation.

Objectives: The objective of this study was to construct a simple quantitative index to rank and select the electromagnetic shields in the radio frequency and microwave radiation.

Study design : A Research Article.

Methods: In this study, the construction of the ranking index was carried out in four main stages that includes, Stabilizing the concept, Analytical structure and Variable selection,

Weighing and Combination of variables, Validating the index. In this study, average, minimum and maximum values of shielding effectiveness as well as standard deviation were considered as a main phenomenon variables. Finally, a *Ranking Index* and *Ranking Difference Index* in term of percentage were made to rank and select the electromagnetic shields.

The Results: In this study a quantitative index was made that is called as "Ranking Index" in term of percentage to rank and select the premier and preferable shield. Moreover, in order to indicate the difference of the power of the shields in shielding effectiveness, the *"Difference Index*" was made in term of percentage.

Conclusion: This study presents a simple quantitative index to rank the electromagnetic shields that could be used as a selection tool in the radiation safety management. Moreover, this ranking index has a simple formula that can be calculated easily and quickly in excel software with high accuracy and low cost. In addition, it could be easily incorporated into a user friendly tool for the ease of application. A case study of electromagnetic Nano composite shields was conducted using the Ranking Index, which showed its capability for ranking the shielding performance of studied electromagnetic shields. It also can create a similar scientific literature to report the efficacy of electromagnetic shields and the selection of preferred shields in different research studies. It is recommended to future studies to examine this quantitative index in other frequency ranges.

Keywords: Classification, Decision Making, Electromagnetic Radiation, Index, Microwave

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5. .In the Materials and methods, more detailed description on the sampling procedure is required.
   All section of material and method were revised and remarked by green highlight in the manuscript.

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6. Although the selected topic is very important but I think there is lack of details in manuscript. In the other word manuscript text is not complete in the line of defined objectives. I encourage the authors to continue to develop his/her research.
   All section of manuscript such as introduction, method, results, discussion and conclusion were revised and more details were added and remarked by green highlight.

OPEN PEER REVIEW

Revision (2)

Here, you can see the **Reviewers**, **Associate Editors** and **EICs'** comments from the beginning to the end of the revision process.

Hossein Ansari: Reviewer | **Revision** (2) 14 Jan 2020

Dear AE,
The authors should mention to the type of study. ”Research article” is not type of study.The rest have been corrected according to the reviewers' comments.
Thanks.

REFEREE: Associate Editor | **Revision** (2) 18 Jan 2020

Dear EIC,
According to the reviewers of the article, the authors need to make minor revision as follow:
The authors should mention the type of study. ”Research article” is not a type of study. The rest have been corrected according to the reviewers' comments
Thanks.

REFEREE: EIC | **Revision** (2) 22 Jan 2020

Dear author
According to the reviewers of the article, the authors need to make minor revision as follow:
The authors should mention to the type of study. ”Research article” is not type of study.The rest have been corrected according to the reviewers' comments.
best

OPEN PEER REVIEW

Revision (3)

Reply to Reviewers

Ideally, the reviewing process can significantly improve the submitted manuscripts by allowing the authors to take into account the advice of reviewers. Author(s) must reply to all reviewers' comments in a separate Word file, point by point. A "**Reply to Reviewers**" document is submitted along with revised manuscript during submission of revised files, summarizing the changes that the authors made in response to the reviewers' comments. The responses to reviewers' comments specifies how the authors addressed each comment the reviewers made.

You can read the authors' responses to the reviewers' comments in the next page.

Dear editor

We are very much thankful to the reviewers for their deep and thorough review. We have revised the manuscript (ID: 97184) and as the Honorable reviewer had requested the type of study design was determined and remarked by blue highlight (a cross sectional study). We hope our revision has improved the paper to a level of their satisfaction.

. In the end, it is hoped that the reforms carried out will be approved by respected editor and reviewers.

With best regards

OPEN PEER REVIEW

Revision (3)

Here, you can see the **Reviewers**, **Associate Editors** and **EICs'** comments from the beginning to the end of the revision process.

REFEREE: Reviewer | **Revision** (3) 7 Feb 2020

Dear AE,
The authors have revised the manuscript based on the reviewer's comment.
Thanks.

REFEREE: Associate Editor | **Revision** (3) 9 Feb 2020

Dear EIC,
The manuscript entitled " A Quantitative Index to rank and select the Electromagnetic Shields in Radio frequency and Microwave Radiation "has been revised based on the reviewer's comment and the article is ready for publication in this journal.
Thanks.

REFEREE: EIC | **Revision** (3) 16 Feb 2020

Dear Author
The manuscript entitled " A Quantitative Index to rank and select the Electromagnetic Shields in Radio frequency and Microwave Radiation "has been revised based on the reviewer's comment and the article is ready for publication in this journal
Thanks.