

## Test-retest Reliability of a Questionnaire to Assess the Ergonomic Knowledge of Computer Professionals

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### Abstract

**Background:** Questionnaire is one of the efficient tool to gather health-related data. Measuring and reporting validity and reliability of research tool are important.

**Objectives:** To establish the test-retest reliability of a questionnaire to assess ergonomic knowledge of Computer professionals.

**Materials and Methods:** An Ergonomic knowledge questionnaire was administered twice at 2 weeks interval to the same set of Computer professionals (N = 20). Pearson correlation coefficients at 95% confidence interval were computed.

**Results:** The test-retest reliability of the sections of the Knowledge questionnaire seems to be fair to high. The results also showed that Correlation values (r) were highly significant for all the sections of the questionnaire (P<0.001).

**Conclusion:** The questionnaire demonstrated adequate test-retest reliability to assess the Ergonomic knowledge of Computer Professionals.

**Keywords:** Computer Professionals, Ergonomic Knowledge, Questionnaire, Reliability

### INTRODUCTION

Questionnaire is one of the efficient tool to gather health-related data. To begin with it is recommended to perform a literature search on earlier used validated questionnaires that can be administered in similar settings and capture variables that are of interest according to the study hypothesis. Wording of questions is very crucial and should take into consideration; appropriateness of the content, level of sophistication of language, type and form, sequence and how is data sought from the respondents. It is necessary to word the questions in a way that they can easily be understood by participant and should be according to their educational level and culture.<sup>1</sup> Measuring and reporting validity and reliability of research tool are important. This can help to give confidence to the readers and researchers about tool.<sup>2,3</sup> Validity is the degree to which an assessment measures what it is supposed to measure.

Reliability means consistency or reproducibility of measurement.<sup>4</sup> It is the degree to which an instrument will give similar results for the same individuals at different times under the same condition. A reliable questionnaire is one that would give the same results if used repeatedly with the same group. The test-retest reliability coefficient gives an estimate of the error of measurement, or the range of fluctuation likely to occur in a single individual's score as a result of irrelevant, chance factors.<sup>5,6</sup>

Ergonomics is the scientific study of human work.<sup>7</sup> Ergonomics plays an important role in the modern working society since it has been recognised that the prevention of work-related injuries not only improves productivity but also affects satisfaction, motivation and creativity.<sup>8</sup> Since its invention in 1948, computers have changed the way world works. It is undoubtedly one of the top ten greatest inventions of mankind. Computers are used to work, to play, to have fun, to shop, to study, to talk, to date and to generally do anything one can think about. In every sphere of life the dependence on computers is ever increasing and this widespread use has led to some important "user" health concerns.

In the absence of a good ergonomic design, extended work for prolonged periods can adversely lead to Musculoskeletal disorders (MSDs). Globally, the number of people suffering from musculoskeletal conditions has increased by 25 percent over the past decade<sup>9</sup> and these conditions make up 2% of the global disease burden. Ergonomics emerges as an issue since many of these musculoskeletal conditions are common computer related injuries.<sup>4</sup> The risks include both improper workstation design and faulty posture as prolonged sitting for extended periods leads to poor circulation, stiffness of joints and pain. Extended hours of continuous work can increase the chance of developing an injury and repetitive strain injuries that develop over time may lead to long-term disability.<sup>10</sup> A little knowledge of the principles of ergonomics of work station setup and exercises can prevent a lot of discomfort and maximize productivity.

The purpose of this study is to establish the test-retest reliability of a questionnaire to assess ergonomic knowledge of Computer professionals using Pearson's correlation coefficient. The tool developed herein will be used for future studies comparing Computer professional's Ergonomic Knowledge with their actual Ergonomic Practice.

### MATERIALS AND METHODS

This research required drafting of an Ergonomic Knowledge Questionnaire for use with Computer Professionals. Approval was taken from Yenepoya University Ethical Committee prior to the commencement of the study. Questionnaires and information from various sources were reviewed,<sup>11-13</sup> and Draft Questionnaire items were created. The draft questionnaire composed of 35 items related to Knowledge about Musculoskeletal disorders and its risk factors, Working Postures, Seating, Keyboard/Mouse, Monitor, Table and Accessories and finally Rest breaks and Exercises. The section related to Knowledge about Musculoskeletal disorders and its risk factors composed of 3 Multiple choice questions(MCQ) and 2 True or False (T or F) questions related to Definition of Ergonomics, Cumulative Trauma Disorders, Goal of Ergonomics, Signs and symptoms of Musculoskeletal disorders and its risk factors.

The Working Postures section composed of 1 MCQ and 4 Tor F questions related to Head, Neck and Trunk, Upper arm and Elbow, Wrist and Hand, Thigh and finally Feet. The Seating (Chair) section composed of 3 MCQs an 2 Tor F questions related to Adjustable back rest, Low back support, Seat height, Seat pan and finally Base of the Chair. The Key board/ Mouse section composed of 3 MCQs and 2 T or F questions related to Key board level, Mouse Size, Mouse grip, Mouse placement and finally Ideal Mouse pad.

The Monitor section composed of 3 MCQs and 2 T or F questions related to Monitor's Position, Level (Height), Tilt, Distance (From the User) and finally presence of Glare. The Table and Accessories section composed of 3 MCQs and 2 T or F questions related to Placement of Telephone and Documents, Document holder, Telephone Usage, Edge of Table's Top and finally Leg room under the Table. The Rest breaks and Exercises section composed of 3 MCQs and 2 T or F questions related to periodically alternating Computer tasks, Micro breaks, Mini breaks, Stretching and finally Eye exercises. The overall content validity index for the questionnaire was 0.98.<sup>14,15</sup>

Required changes were made to clarify any ambiguity and to ensure comprehension of the study participants. This questionnaire was administered twice to 20 computer professionals after obtaining informed consent. The participants were both males and females of age ranged from 20 to 51 years (mean = 33.8 years). Subjects were included if they worked in computer for minimum 3 hours/day on an average and had completed minimum 1year of experience in the present or previous job. The test interval was 2 weeks. The first set of completed questionnaires was used for the test, while the second set was used for the retest.

**Statistical Analysis**

Pearson's correlation coefficient at 95% confidence intervals was computed for each selected item. P value <0.05 was considered statistically significant.

**RESULTS**

The result revealed that the strength of correlation between the two tests are high. The r

**Table 1 Test-retest Reliability of Ergonomic Knowledge Questionnaire**

Sections (Knowledge About)	Pearson Correlation Coefficient (r)
Musculoskeletal Disorders and its Risk factors	0.91*
Working Postures	0.79*
Seating	0.84*
Keyboard/Mouse	0.77*
Monitor	0.75*
Table & Accessories	0.76*
Rest breaks & Exercises	0.83*

\* - P< 0.001- Highly Significant

value for the sections of the questionnaire (Knowledge about musculoskeletal disorders and its risk factors, Working postures, Seating, Key board and mouse, Monitor, Table and accessories) are presented in **Table 1**. The least r value was 0.75 (Knowledge related to monitor) and highest was 0.91(Knowledge about musculoskeletal disorders and its risk factors). The results also showed that Correlation values (r) was highly significant for all the sections of the questionnaire (P<0.001).

**DISCUSSION**

The aim of the present study was to develop a reliable questionnaire covering aspects of ergonomic knowledge. In this study the test-retest reliability was established by Pearson correlation coefficient. The calculation or proportion that is sufficient for determining content validity agreement was searched in the literature. The following categorization has been suggested for Pearson correlation: high reliability >.90, good reliability .80-.89, fair reliability .70-.79, and poor reliability <.70.<sup>16</sup>

The test-retest reliability of the sections of the Knowledge questionnaire seems to be fair to high. The section regarding Knowledge related to monitor was classified as having fair reliability (r = .75), whereas the section regarding Knowledge about musculoskeletal disorders and its risk factors was classified as having high reliability (r = .91). None of the section was classified as poor reliability. Wikman has shown that the reliability in survey questions concerning working environment varies considerably between different questions

and that for many questions reliability is bad over time. This finding is not in agreement with the findings of the present study.

The correlation between the two measurements could be affected by lack of stability of the measured variables, type of questions, type of scale categories and differences in the distribution of answers, reactivity and memory effects, differences in response rate to the questions, and by random factors.<sup>17</sup> Based on the test-retest reliability of the questionnaire, it is believed that this questionnaire can be successfully used as a reliable tool to assess the ergonomic knowledge of computer professionals.

### CONCLUSION

In order to have confidence in the outcomes of a research, one must be ensured that the tool consistently measures what it purports to measure when perfectly administered. In brief, the tool must be both valid and reliable. In this study, Test-retest reliability of the ergonomic knowledge questionnaire was assessed by Pearson correlation coefficient. The results demonstrated fair to high reliability for the sections of the questionnaire. Hence, it can be concluded that this questionnaire can be successfully used as a reliable tool to assess the ergonomic knowledge of the computer professionals.

### CONFLICTS OF INTEREST

None declared

### ACKNOWLEDGEMENT

Author is grateful to the computer professionals participated in this study. This project was supported by Seed Grant for Research for Faculty of Yenepoya University (YU/Seed Grant/2011-012).

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*Cite this article*

Sirajudeen MS, Pillai PS. Test-retest Reliability of a Questionnaire to Assess the Ergonomic Knowledge of Computer Professionals. International Journal of Health and Rehabilitation Sciences.2015;4(4): 239-243.