

A Study of Reliability and Validity of Rula against Reba Among The Employees Operating Computers In The Bank

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Abstract

The International Labour Organization (ILO) in association with, World Health Organization (WHO) had found respect musculoskeletal issue (MSDs) as a business caused infection, which is likewise alluded to as "another plague" that ought to be inquired about and solved. MSDs affect business-related nonappearance and a high extent of days lost is expected to MSDs. Therefore, it influences the strength of workers as well as makes weight on the wellbeing framework, on the organizations monetary, and on the social expenses to manage their consequences. MSDs prevention is required in various countries to empower authorities to avoid the reactions of MSDs, improve working benefit, and reduce the weight on restorative systems at the comparable time. In creating nations like India, numerous projects for the counteractive action of MSDs have been connected to the working environment. This study puts in an effort to study the reliability and validity of rula against reeba among the employees operating computers in the bank.

Keywords: Validity, Reliability, REBA, RULA.

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INTRODUCTION

Musculoskeletal issue (MSDs) speak to one of the main sources of word related damage and handicap in the created and modernly creating nations. The monetary misfortune because of such issue influences the person as well as the association and the general public all in all. It has been generally acknowledged that unbalanced and compelled stances bring about the musculoskeletal weight on various body districts of situated laborers and are the main consideration in the advancement of musculoskeletal issue. Poor stances have additionally been observed to be related with diminished effectiveness of execution, a significant reason for which was perceived to be the body uneasiness coming about because of the limited stances. The Rapid upper appendage appraisal (RULA) device is one among numerous apparatuses which can survey act among laborers. RULA is a vocation examination instrument that utilizes quantitative strategies to recognize occupations that do and don't open laborers to an expanded danger of creating furthest point and cervical disorders [1]. The Rapid upper appendage appraisal helps in distinguishing proof of employments that have an expanded danger of furthest point and cervical issue, for example, average and horizontal epicondylitis, ligament ensnarement at the dorsal wrist

and digits, per tendinitis, carpal passage disorder, cervical spondylitis [2-4]. Although Rapid upper appendage evaluation technique was gotten from standards identified with physiology, biomechanics, and the study of disease transmission of furthest point and cervical issue, no investigations exist which demonstrates the test-retest capacity of RULA. Unwavering quality of a device is the ability of the instrument to duplicate past estimations of a similar object of study.⁴ This is typically broken into intra-and between rater dependability. Intra-rater dependability is the capacity of an apparatus to recreate estimations autonomous of when estimations are recorded [4, 5]. Intra-rater unwavering quality is otherwise called test strength or test-retest repeatability; the last equivalent word will be utilized in this investigation. The motivation behind this examination is to explore intra-rater dependability of the Rapid upper appendage appraisal instrument.

Objective of the Study

- To estimate the intra rater reliability of RULA among employees operating computers in the bank.

- To estimate inter-rater reliability RULA among the employee operating computers in the bank.
- To estimate the criterion validity of RULA against REEBA among the employees operating computers in the bank.

- Video camera Canon 720
- Measuring tape, (Cobra, 60 inches, 152 cm)
- Weighing machine (Krupps)
- Computer
- Computer software – Ergonomics posture analysis tool
- RULA forms and manuals

METHODOLOGY

Study Design

- The study design was a cross-Sectional Study, correlation study

Ethical Clearance

- Ethical clearance from Institutional Ethical Committee of Srinivas University, Mangaluru, Karnataka reference number SRNU/2008/936 dated 24.06.2008.

Study Location

- State bank of India (SBI) and associated banks in Mangalore.

Study Settings

- The study was conducted at the office premises of bank employees.

Study Population

- Bank employees were recruited from the State bank of India (SBI) and associated banks in Mangalore

Sampling

- Simple random sampling (computer-generated random numbers)

Subject Selection Criteria

Inclusion Criteria

- 25 -40 years of age, (before menopause in female).
- Male and female with normal development
- Working in computers

Exclusion Criteria

- Impaired Vision (initially asked about the vision problem or medically pre-diagnosed child)
- Low back pain
- Any other medical, surgical and psychological conditions that prevent the child participation

Sample Size

Total bank employee recruited for the study was 301.

Study Duration

The data collection was done from August-2017 to March- 2018)

Materials Used For Data Collection

DETAILED PROCEDURE OF PRESENT WORK

Ten physiotherapists will be drawn nearer to rate digitized video reports (AVI Records) picked by the researcher to be illustrative of the PC business similarly as covering the full extent of the RULA undertaking factors. At the point when the errand variables were doled out a rating, the evaluations were used to figure the last RULA score.

The rater buddy will contain ten physiotherapists. All individuals, paying little personality to inclusion, will be permitted an eight-hour instructional exercise on using the Rapid upper extremity examination. This included establishment on RULA measures, RULA applications, video records cases of occupations, displays on the most ideal approach to apply examinations to video archives, and an open discuss model results. Each rater was given a DVD containing 75 work video archives, a direction and approach manual. Each part was drawn closer to survey work video reports as composed by the direction manual and to use the encased structures to record task variable examinations, assessments, observations, and moreover estimations. The individuals were drawn closer to mail the structures to the experts. The second round started someplace in the scope of three and seven months after completion of cycle one. In cycle two, individuals will be requested to independently re-examine a comparable video record, repeating the technique from the hidden appraisal.

Quick Upper Limb Assessment (RULA.) scores are resolved for the position of each body part. A score of 1 exhibit the best or most fair position, e.g., arms by the sides, elbows in generally 90° flexion, wrists in fair-minded position, lower arms mid-way among pronation and supination, neck in 10° flexion, trunk and legs sitting and all around maintained. A score of 4 demonstrates the most exceedingly horrible position: e.g., shoulder flexion above 90° or flexion someplace in the scope of 45° and 90° and grabbing. The joined individual scores for shoulder, elbow and wrist gave score An and those for neck, trunk and legs gave score B. Muscle use and power connected in every errand in the video were attributed a score of 1 and 0, independently, because they are static positions without stacking; these scores were added to scores An and B to obtain scores C and D, respectively. 11 Based on the structure of the RULA method, each blend of scores C and D (different 1-7), considered superb score and

mirrors the musculoskeletal stacking related to the pro's position. While low astounding scores (of 1 or 2) exhibit that the work position is sufficient, action is proposed for the higher scores: further assessment and changes at whatever point required, for awesome scores of 3 or 4; brief assessment and changes for phenomenal scores of 5 or 6 and brisk assessments and changes for a dynamite score of 7.

Validity

The synchronous authenticity of RULA was developed with the premise referenced, Rapid Entire Body Assessment (REBA). REBA was expected for basic use without the necessity for a moved degree in ergonomics or expensive rigging. Using the REBA worksheet, the evaluator doled out a score for all of the going with body districts: wrists, lower arms, elbows, shoulders, neck, trunk, back, legs and knees. After the data for each region is assembled and scored, tables on the structure are then used to amass the danger factor factors, delivering a singular score that addresses the level of MSD shot.

Information Investigation

The ordinariness of gathered information was built up by the Kolmogorov-Smirnov test ($n > 50$). As the information does not pursue typical circulation the unmistakable measurements of statistic attributes were communicated in mean with 95% CI, middle and range. Unwavering quality was built up by utilizing intra-class relationship coefficient ICC (3, k) for between rater dependability and ICC (2, 1) for intra-rater dependability with 95% certainty interim (CI). As per Shrout and Fleiss (1979), ICC translation < 0.5 indicates poor unwavering quality, $0.5-0.75$ to be moderate dependability, $0.75-0.90$ shows great unwavering quality and > 0.90 as phenomenal reliability.³⁰ The simultaneous legitimacy of RULA was built up with the basic measure, REBA test by spearman's rank relationship coefficient test ($n = 301$). For all information investigation level of centrality (LOS) was set as $p < 0.05$. Measurable examination of gathered information was performed utilizing the factual bundle of sociologies (SPSS, adaptation 20.0 Inc, Chicago, IL)

RESULTS

Table-1: Demographic dimension of the participants recruited (n=301)

Demographic dimensions	Mean (95% CI)	Median	Range
Age (years)	38.1 (32.0-39.2)	38	24-55
Height (cm)	172.2 (171.2-173.2)	173	152-188
Weight (Kg)	80.7 (79.6-81.8)	81	58-97
BMI (Kg/m ²)	27.1 (26.9 -27.3)	27.4	20.3-28.7

Abbreviations: CI – confidence interval; cm – centimetres; kg – kilogram; BMI – Body Mass Index

Table-2: Demographic dimension of the male and female participants recruited

Demographic dimensions	Male (n=170)	Female (n-131)	p-value
Age (years)	36.1 (34.7-37.4)	40.8 (39.1-42.6)	0.06
Height (cm)	178.2 (177.3-178.9)	164.5 (163.3-165.6)	< 0.001
Weight (Kg)	86.9 (86.0-87.8)	72.7 (71.3-74.0)	< 0.001
BMI (Kg/m ²)	27.4 (27.2-27.6)	26.8 (26.5-27.2)	0.48

Abbreviations: cm – centimeters; kg – kilogram; BMI – Body Mass Index

Table-3: Cronbach's alpha and intraclass correlation coefficient for Intra- rater reliability and Inter-rater reliability of RULA

Reliability	Cronbach's alpha	ICC	95% CI (ICC)
Intra- rater	0.96	0.92	0.90-0.94
Inter-rater	0.95	0.91	0.89-0.93

Abbreviations: ICC – Intra class correlation coefficient; CI – confidence interval

Table-4: Concurrent validity of RULA against criterion measure REBA

Concurrent validity	RULA Vs REBA	P-value
Spearman's rank correlation (ρ)	0.91	< 0.001

Abbreviations: REBA - Rapid Entire Body Assessment; RULA - Rapid Upper Limb Assessment

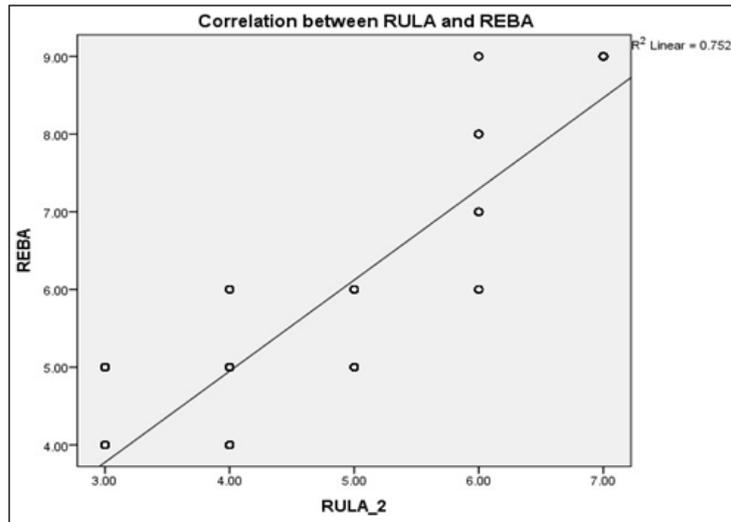


Fig-1: Scatter plot describing the association between RULA and REBA

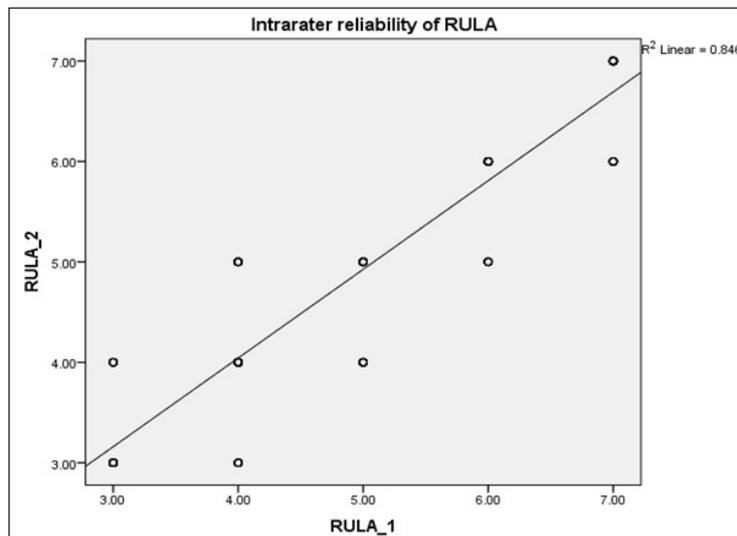


Fig-2: Scatter plot portraying the intra-rater reliability of RULA among bank employees

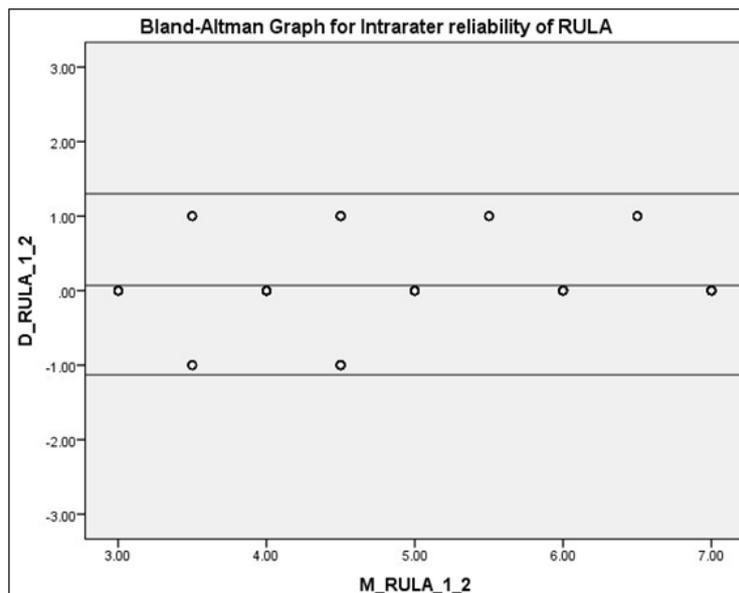


Fig-3: Scatter plot portraying the inter-rater reliability of RULA among bank employees

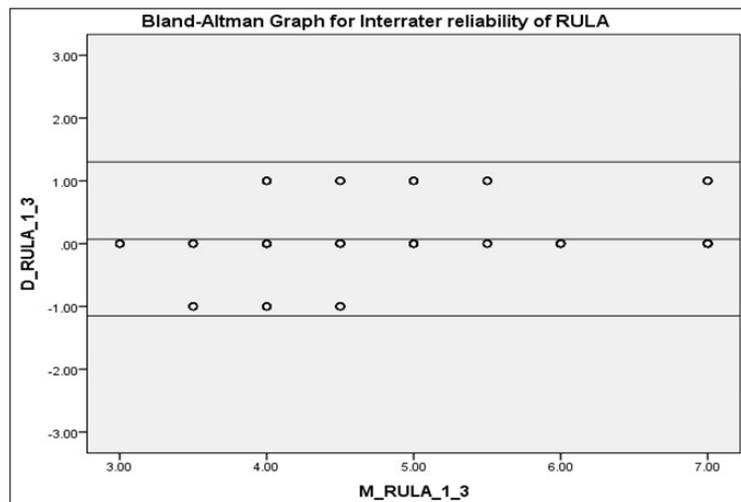


Fig-4: The Bland Altman graph shows LOA in inter-rater reliability of RULA

DISCUSSION

In this examination the legitimacy and unwavering quality of RULA is set up. The aftereffect of the investigation exhibited that RULA is observed to be substantial and solid among bank specialists. RULA has great simultaneous dependability with REBA. To best of our insight, this article is the principal report of legitimacy and unwavering quality among bank representatives by RULA. The purpose of executing this examination among the bank representatives is that the worker spent practically the most extreme piece of working hours before PCs or workstations. The situation of the PC while being utilized is a significant indicator for creating musculoskeletal torment as this identifies with the idea of ergonomic behaviour [6]. Working extended periods without lay on a workstation or PC puts an impressive strain on the position of trunk and neck flexion with hyperextension of the upper cervical spine.

Routine stances may get influenced straightforwardly by PC use. Notwithstanding utilizing PC for exceptionally low spans could have a destroying impact on stance which may cause the lasting changes in the routine stance through transient postural changes. Other factors, for example, poor social working may prompt both more prominent measures of PC use and changes in stance which may impact the PC use while we considering the ongoing stance. As the PC use has a causal impact on constant stance, the long haul consequences for the musculoskeletal framework is of potential our worry. A large number of the progressions in postural edges related with PC use were reliable crosswise over various sitting conditions. For instance, more prominent PC use was identified with more noteworthy lumbar expansion in females when looking forward, looking down, and drooped sitting. This pattern most likely identifies with an abnormal state of the relationship between spinal edges over these three unmistakable sitting positions in the two folks and females. Regardless, these affiliations would, by and

large, endure when standing. The connection between head flexion and PC use in folks that was found in the sitting position resembled that seen during standing. Moreover, the connection between lumbar point and PC use in females found in the sitting position resembled that seen during standing. These unfaltering affiliations demonstrate that PC use may apply an effect on progressing spinal stances.

PC use could in like manner impact steady positions by suggestion, as physical activity or torment. Unusual measures of PC use may incite diminished physical development, with the following lessening in muscle persistence that could impact consistent stance. High degrees of PC use may extend neck torment.

There are five elements which may impact the relentless nature of this assessment. They were the work, the worker, the technique, the rater and the time. The variables that may have impacted clearly faithful quality was time (test-retest) and the experience of the raters, in spite of the way that it that attested that experience rater level add to tremendous differentiation in the RULA scores. On the other hand, the raters were extraordinary comprehension for the majority of the methods in the middle of rater assessment using RULA.

Levanon *et al.*, [7] revealed that mRULA was found to have moderate to the great level of ($r=0.6-0.7$) simultaneous legitimacy for the evaluation of PC workers. This is less substantial when contrasted with our aftereffects of a good level of simultaneous legitimacy ($\rho=0.91$) of RULA against REBA. Thus moderate to great level of developing legitimacy ($r=0.69$) against overhauled Upper Extremity Work Demand (UEWD-R) Scale 35 and strain list ($\rho=0.61$).

The intra-raters' unflinching quality for the Brazilian variation RULA went from poor to for all intents and purposes perfect ($k: 0.00-0.93$) while the between raters' constancy was very poor for RULA ($k: -$

0.12 to 0.13).21 Good test-retest steadfastness of ICC = 0.79 was represented by Cavalini *et al.*, [8].

RULA displayed the rooftop sway only a little over the farthest point of 10%. This discovering demonstrates that the technique has certain inconvenience in perceiving the level of peril presentation between the high-chance endeavors, and may interfere in the gathering for fundamental administration concerning the brief or conceded intercession. Everything considered this is the first assessment to display the authenticity and the relentless nature of RULA among the bank laborers.

Validity and Reliability

Proof of endorsement of REBA instrument was given by Hignett and McAtamney [9] where between observers immovable quality between the 14 individuals for coding was seen to be someplace in the scope of 62 and 85%. Janowitz *et al.*, [10] found that between observer unflinching quality is moderate except for the neck and upper members. Face authenticity was polished in two phases; the main included coding 144 position blends by three ergonomists and joining the honing thoughts of weight, coupling and development scores to deliver the last REBA score (1-15), with related peril and movement levels and the ensuing stage included 14 specialists for the gathering and individual coding of in excess of 600 examples of positions from human administrations, control and manufacturing organizations [9, 11]. Farsighted authenticity, that is the way by which well the hazard estimation of the procedure has been exhibited to be related to or on the other hand anticipating musculoskeletal issue, was shown by Jones and Kumar [12] that unassuming degrees of understanding between strategies explored affirm hazard level yield will rely upon the technique utilized and there is an important danger of contradiction between strategies. The outcomes of their examination avow the compelled comprehension between circulated ergonomic peril assessment strategies Dima Al Madani and Awwad Dababneh/American Journal of Engineering and Applied Sciences. what's more, the necessity for concentrates prepared to take a gander at the judicious authenticity of the systems in a comparative worker people to show the present best model. The consequence of this logical inconsistency is the mixed up examination of danger just as unmistakable evidence of issue exposures.

To the extent synchronous authenticity; how well the system relates with progressively generous procedures, a couple of examinations used REBA to differentiate the results and other observational and direct methodologies to decide the degree of comprehension between the two. Various examinations [13, 12, 14-16] present results standing out two from five methodologies for reviewing WMSDs peril. With the exception of Kee and Karwowski [14] study, where

OWAS, REBA and RULA systems are considered using data from a case of 301 positions gotten from various present-day parts, relationships are generally made using test estimates that are pretty much nothing and furthermore from a lone workplace [12].

Kee and Karwowski [14] paper, REBA showed up the most raised intra-rater unflinching quality among OWAS and RULA.

The connection results for RULA and REBA seem more understanding than that obtained by Kee and Karwowski [14]. These makers declared 48% consistency, as appeared differently in relation to 73.7% in Chiasson *et al.*, [17] study. The complexities between the activity levels and danger arrangements used can be the clarification behind the assortment.

Using comparative danger classes as Chiasson *et al.*, [17] study, Jones and Kumar [12] conveyed 66% congruity among RULA and REBA, regardless of the way that with an uncommonly little model (four workstations in the identical mechanical division).

A high random occasion between the two procedures was shown by De Sa *et al.*, [18].

REBA discernments have contrasted sensibly with those of the OWAS system as demonstrated by Takala *et al.*, [19], regardless of the way that REBA gathered more positions to have an increasingly raised measure of risk. No reports on association with the musculoskeletal issue were found. For leg and trunk positions, between intra rater repeatability was moderate to extraordinary anyway low for upper limbs. Limitations Being an observational assessment gadget, REBA is a conceptual procedure; it needs detail and exactness and spreads three noteworthy risk factors: Force, repetition what's more, demonstration. Coyle [16] and Janowitz *et al.*, [10] exhibited that.

A couple of factors (e.g., turning, parallel bending, grabbing) are weighted correspondingly by REBA regardless to what degree they exist (e.g., 5° winding or 20° of turning). As demonstrated by Coyle [16], REBA is time using; the "most detectably awful position" contrasts depending upon the body part being surveyed.

The data for the benefit and left hand can't be joined so they ought to be surveyed autonomously; the customer needs to pick what to watch (e.g., positions requiring the most solid activity, practically once in a while repeated positions, or positions known to cause the most burden) [20-22]. Length and repeat of things are not considered; the nonattendance of a period delicate measures in REBA prompts 'the most ordinary' positions and the high commitment cycle positions being situated the equal [23, 17, 24, 12, 19]. Concentrates kept an eye on agreeing that no technique

has been found legitimate for all applications. An all out appraisal of WMSDs chance in the workplace ought to be done using multiple strategies. A workstation can have danger factors that a couple of systems don't consider; the extent of percent understanding between occupations suggests that the methods differ in their sensibility to the presentation profiles of different occupations.

CONCLUSION

This investigation has inferred that RULA is a dependable device, which can be utilized in PC laborers particularly bank representatives. RULA is likewise indicating magnificent simultaneous legitimacy with REBA.

RULA assessment recommends the snappy execution of ergonomics intercessions with authentic data among workers and prosperity guidance on ordinary postural change, execution, and seeing of laws among organizations are endorsed to cut down word related danger because of musculoskeletal issue.

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