



TECHNICAL UNIVERSITY OF CLUJ-NAPOCA

ACTA TECHNICA NAPOCENSIS

Series: Applied Mathematics, Mechanics, and Engineering
Vol. 68, Issue IV, November, 2025

COMPARING THE ERGONOMIC METHODS USED TO ASSESS THE IMPACT OF HUMAN BODY POSITION ON VISUAL COMFORT FOR COMPUTER USERS AND PROGRESSIVE LENS WEARERS

Adrian Catalin LUNGU, Luciana CRISTEA, Mihaela Ioana BARITZ, Cornel DRUGA, Angela REPANOVICI, Serghei RAILEAN, Anca Ioana TATARU, Gyory BODI

***Abstract:** The principles of the field of ergonomics applied and used in various studies of behavior assessment in comfort as well as in opportunity studies to identify causes of manifestation of musculoskeletal dysfunctions are increasingly developed to create effective and safe mechanisms of analysis for specialists in the field. Thus, the authors of this paper intend to analyze, in relation to the criteria highlighted in various studies, the opportunity to use one or another of the ergonomic methods in assessing the influence of the human body posture on the level of visual comfort for computer users and progressive ophthalmic lens wearers. In the first part of the paper, some general aspects are reviewed so that in the second part to identify the useful set of ergonomic methods for this combined field - posture and sensory systems. In the third part of the paper, the authors present a case study for a subject, a carrier of progressive ophthalmic lenses and performing computer activity, to identify the most effective, complete and useful method of assessing comfort. The end of the paper presents the results and conclusions from the analysis.*

***Key words:** Ergonomics, visual comfort, evaluation methods, posture, progressive lenses.*

1. INTRODUCTION

According to the linguistic definition, posture is a term used to describe the “attitude, held, position in which the human body or other bodies are located at a given moment” [1]. On the other hand, from the point of view of the biomechanics field, this characteristic is essential for setting the limits of normal and/or abnormal movement and/or positioning in the functioning of the human body.

Musculoskeletal dysfunctions or injuries resulting from exercise above normal typically have a common cause: overloading the structures of the human body (such as joints, tendons, and other structures, ligaments and muscles) due to repetitive and/or excessive tension in improper postures.

If these manifestations are also accompanied by decreases in human sensory systems, such as vision, hearing or sense of touch, then the effects are amplified and can induce complex dysfunctions, installation of professional

pathologies or even loss of work capacity or normal living.

In this regard, periodic evaluations on all levels of structures of the human body and in different areas of activity can lead to the prevention of the occurrence of musculoskeletal or sensory dysfunction, to identify how they evolve over time and changes in lifestyle or professional activity.

While numerous methods of ergonomic analysis aim to evaluate the level of risk associated with the effort, at this stage we are looking for solutions for the implementation of complex and combined techniques based on the principles of biomechanics, opto-electronics or artificial intelligence to be able to achieve a more comprehensive and accurate risk assessment and even to identify improvement solutions.

The procedures for assessing posture (the biomechanical structure of the human body) and static or dynamic load from a certain posture that can cause overstrain are complex tasks. At the

same time, the principles of biomechanics are developed through the correlated approach between the human body as a mechanical system (composed of levers, pulleys, pulleys, arches, etc.) together with the sensory systems coordinated by the central unit (central nervous system).

Thus, it becomes possible to apply the laws of physics to determine whether overloads of articular charge combined with excessive sensory exposure occur during the execution of a normal or extreme activity using these principles and functional connections. The use of tension assessment procedures in all joints of the human body in a static or dynamic state is a complex and combined action [2].

For these reasons, and to achieve general calculations can be used simplifying assumptions and mathematical models, schematic models of the human body and models of functional structures.

Such a model of the human body is described by the number of segments that make up the body, the number of joints, the boundaries of interdependent movement, and the location of the centre of gravity and the weight of each segment.

This data set forms the group of inertial parameters of the human body model, and the procedure for its segmentation can usually be carried out in a number of 14-15 segments (head and neck, head, trunk, thigh, leg, arm, forearm and hand) (Fig. 1).

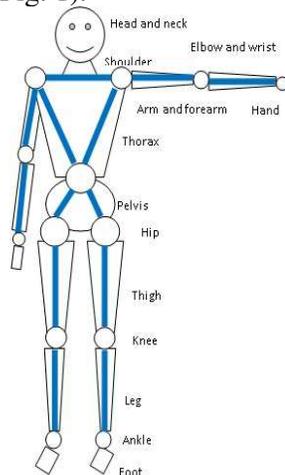


Fig. 1. Model of 15 segments of the human body in bipedal position [2].

Other models divide the trunk into two, three or more segments, and another common change

in some biomechanical research and essential in dynamic analysis is the simplification of the model by reducing the number of segments, which means that some joints behave rigidly, losing mobility between adjacent limbs.

In addition to this model of the human body in bipedal position, can be added, for specific research and other biomechanical models such as the human body in sitting position, walking, in various static or dynamic states corresponding to the activities. Also, the, along with these postural biomechanical models, the correlation with human sensory systems must also be considered to obtain a complete picture of the level of risk or behavior in the state comfort [3].

2. SET OF ERGONOMIC ASSESSMENT METHODS

From the point of view of the evaluation procedure it is found that frequent or repeated adoption of inappropriate positions at work can lead to fatigue and, over time, to, it can cause dysfunctions or even health problems due to professional pathologies.

Therefore, assessing and reducing static/dynamic postural loads is an important step in improving workplace ergonomics and avoiding the installation of dysfunctions or health problems. Currently, multiple digital methods and applications can assess the risk associated with postural loads.

Software applications are characterized by their scope, individual positions, or integration with sensory systems or the conditions of application or body parts considered for evaluation.

Methods accepted and validated by specific standards are methods or techniques of observation or quantification widely used to evaluate posts (in any form) in the practice of daily physiological or professional activities.

Examples of such methods are:

- RULA (Rapid Upper Limb Assessment);
- REBA (Rapid Entire Body Assessment);
 - OWAS (Ovako Working posture Assessment System);
 - LUBA (Load of the upper body assessment);

- NERPA (Novel Ergonomic Postural Assessment Method);
- ROSA (Rapid office strain assessment);
- RPA (Rapid postural assessment);
- OCRA (Occupational Repetitive Action);
- FANGER (Method to estimate thermal comfort);
- JSI (Job Strain Index);
- BIO-MECH (static coplanar biomechanics).

Besides these, periodically new applications or procedures appear dedicated to cases determined in different situations or more extensive areas (agriculture, specific industry, social, entertainment, etc.), or which are constituted as generalized structures which aim to cover as many of the variants of ergonomic assessments as possible.

In general, comparisons between ergonomic assessment methods are geared towards identifying the causes of deviations from normal and comfortable behavior, then to establish the degree of risk regarding the installation of musculoskeletal dysfunctions in direct interaction with the activity environment.

Some of these techniques are developed on clear principles for identifying ways to ensure comfort in simple situations, specific to certain

areas of activity, and avoid additional fatigue or situations of dysfunction caused by prolonged, repetitive and/or excessive movements [4-6].

These ergonomic assessment procedures or techniques are useful and often necessary to achieve an improvement in the working conditions, to increase the efficiency of activities and to achieve a comfortable and stimulating environment.

The primary criteria for building a comparison procedure among multiple techniques are:

- Types of activities (simple, repetitive, excessive, prolonged etc.);
- The type of posture that affects the most (static, dynamic, bipodal, seated etc.);
- Establishing the main effects that manifest in activity (musculoskeletal disorders, poor sensory perceptions);
- The possibility of intervention to eliminate the effects on short or long duration.

Thus, work-related musculoskeletal disorders (WMSD) are one of the most common professional dysfunctions experienced by industrial workers and not only, representing approx. 67% from occupational injuries and illnesses in Korea in 2019 and 29-35% in the USA in 1992-2010 [4].

Table 1

General characteristics of the evaluation procedures.

| Method | The human body area | Posture regime | Force | Dynamic load | Type of observation | No. risk category | Pairing | Strengths | Weakness |
|----------|---|----------------|------------------------|--------------|--|-------------------|---------|---|--|
| RULA | Upper and lower limbs, wrist, neck, trunk, foot | YES-Static | 4 | NO | No detailed rules | 4 | NO | Quick and easy to evaluate | Focused on the posture of the upper limbs Coupling not included The need to decide which side to observe |
| REBA | Upper and lower limbs, wrist, neck, trunk, foot | YES-Static | 3 +1 adjustment factor | YES | The most common posture, prolonged, loaded | 5 | YES | Quick and easy to evaluate | The need to decide which side to observe |
| OWAS | Back, arms, legs | NO | 3 | NO | Sample of time | 4 | NO | The fastest and easiest to use. Detailed classification of the posture of the feet | Posts of the neck, elbow and wrist, repetition, coupling and static posture are not included |
| ROSA | Back, arms, legs | YES-static | 3 | NO | The most common postures | 4 | YES | Quick and easy to evaluate | The need to decide which side to observe |
| BIO-MECH | The integral human body | | 4 | YES | The most common postures | 4 | YES | Complex assessment | The need to decide which side to observe |

Therefore, for the management and prevention of WMSD, it is important to identify the type and degree of exposure to risk factors, to use the best and most complete method of evaluation, then, to finally develop intervention programmes that reduce workload to levels acceptable to workers [7, 8].

While using measuring instruments directly on the human body (capture/measuring motion parameters, angles and angular displacements, force sensor responses/pressure) has become an expensive and sometimes inefficient process, it is found that the widespread introduction of observation/appreciation methods (such as optical evaluation/fast video of the upper limbs - (RULA) [9], fast evaluation of the whole body (REBA) [10] and activity-long posture analysis system (OWAS) [11]), respectively, it has become a current way of working in the field of applied ergonomics.

These methods, besides many others, applied as computerized techniques of direct observation are versatile, easy to use, easy to use, flexible and do not interfere with the activities of the human subjects analyzed and also can be used in real conditions of their activity [12].

In this analysis and considering the field in which they applied, they were first chosen from the multitude of methods that have been developed over time, the following direct observation and evaluation procedures:

RULA, REBA, OWAS, ROSA and BIO-MECH.

3. ERGONOMIC ANALYSIS OF THE COMPUTER POSTURE OF A PROGRESSIVE LENS WEARER

The progressive type of lens eyewear has become a very effective correction and visual aid device for a frequent computer user but also shows important refractive defects. However, in addition to the need for better correction of refractive defects for the human factor, the fact that the activity focuses mainly on the small and medium distance vision capacity, in the prolonged period and in the preferential direction, there is currently a primordial requirement on their part to have a high level of visual comfort.

Because of this, it is important that when preparing the anamnesis of the computer user that requires visual correction with progressive lenses, to analyze and evaluate all parameters of the respective activity (working time, working time, small-medium vision distance, area of activity, type of activity, etc.).

In this way, the actual requirements of the user can be clearly defined, we can see which are the ways of affecting the attention and visual memory but can also identify and remove/reduce the sources of visual fatigue, the level of visual stress and risk in activity.

In this case study and using the most appropriate methods (limited to 3 of the 5 initially chosen), hierarchy obtained from performance analysis (RULA, RULA, REBA and ROSA) to identify the posture problems of the user wearing progressive lenses and with predominant activity at the computer, the analysis started from the elements of the anamnesis questionnaire.

This form of knowledge of the requirements of the human subject establishes initial indications of the existence or not of some form of visual stress.

Also, the, from the same information can be identified a level of additional eye fatigue manifested by discomfort at light radiation and even some form of muscle fatigue in the upper part of the human body trunk (neck, throat and shoulder, upper limbs, wrist).

For the identification of postural problems, the adopted procedure contains the following stages of analysis of the induction/simulation of possible work situations:

1. Placing the laptop very close to the user, the screen positioned at approx. 90^0 to the keyboard surface (horizontal), seat/mass height in normal limits, called in posture analysis 1 (P1) (Fig. 2);
2. Placing the laptop further away from the user (with support of the upper limbs on the table), the screen positioned at approx. 90^0 to the keyboard surface (horizontal), the seat height /table in normal limits, named in posture analysis 2 (P2) (Fig. 3);
3. Placing the laptop very close to the user, with the screen tilted at an angle greater than 45^0 compared to the normal on the keyboard surface, seat/table height in normal limits, the, named in posture analysis 3 (P3) (Fig. 4);

4. Placing the laptop further from the user (with support of the upper limbs on the table), with the screen tilted at an angle of more than 45° from the normal on the keyboard surface, seat height/mass within normal limits, called in posture analysis 4 (P4) (Fig. 5);

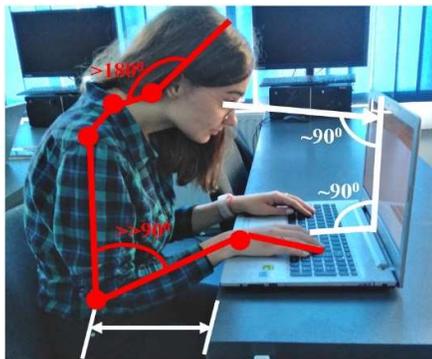


Fig. 2. Case study: simulation of the position at the computer of a progressive lens wearer, posture no.1.

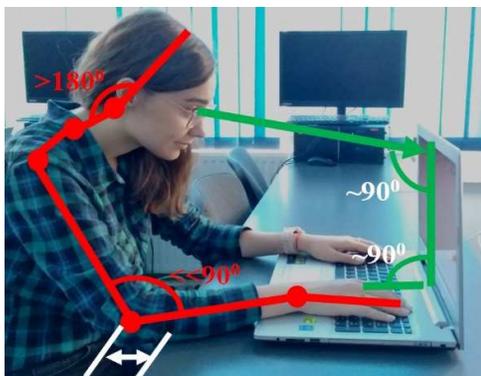


Fig. 3. Case study-simulation posture no.2.

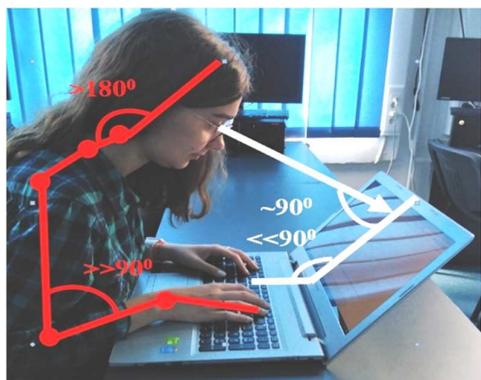


Fig. 4. Position simulation case study no.3.

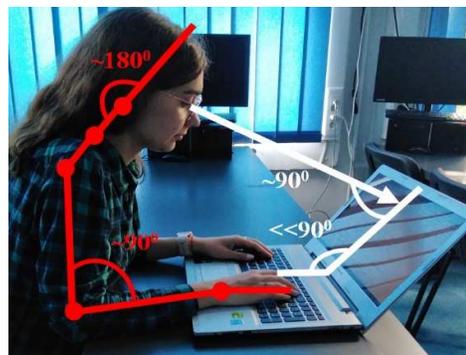


Fig.5. Position simulation case study no.4.

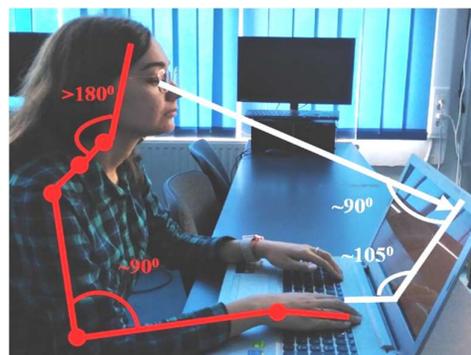


Fig. 6. Position simulation case study no.5.

5. Placement of the laptop further from the user (with support of the upper limbs on the table), with the screen tilted at an angle of approx. 105° , seat height / table in normal limits, correct use of progressive lens glasses, called posture 5 (P5) (Fig. 6).

In all these cases (posture 1-5) in the working environment were preserved the same initial conditions of normal atmospheric pressure, ambient temperature of $22^{\circ}\pm 2^{\circ}\text{C}$, lighting of 200-300 lx etc., natural light source on the left side, no noise or vibration in the activity area.

All these parameters and the initial values were preserved throughout the evaluation period.

Thus, applying in turn the three procedures have identified the defective posts that can induce discomfort both visually and postural, can decrease the ability to concentrate and visual memory, they can cause a decrease in work capacity and develop, over time, forms of musculoskeletal dysfunction.

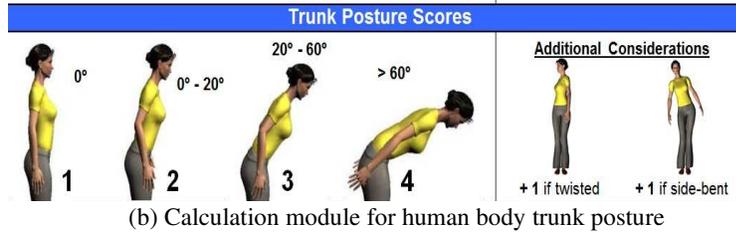
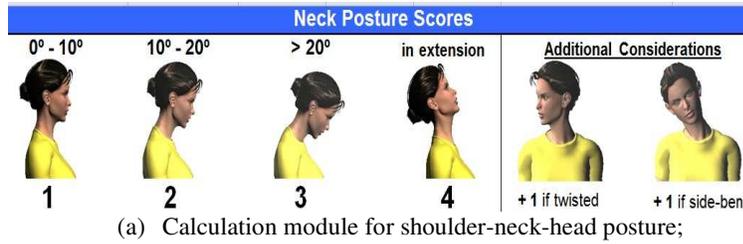


Fig. 7. RULA method.

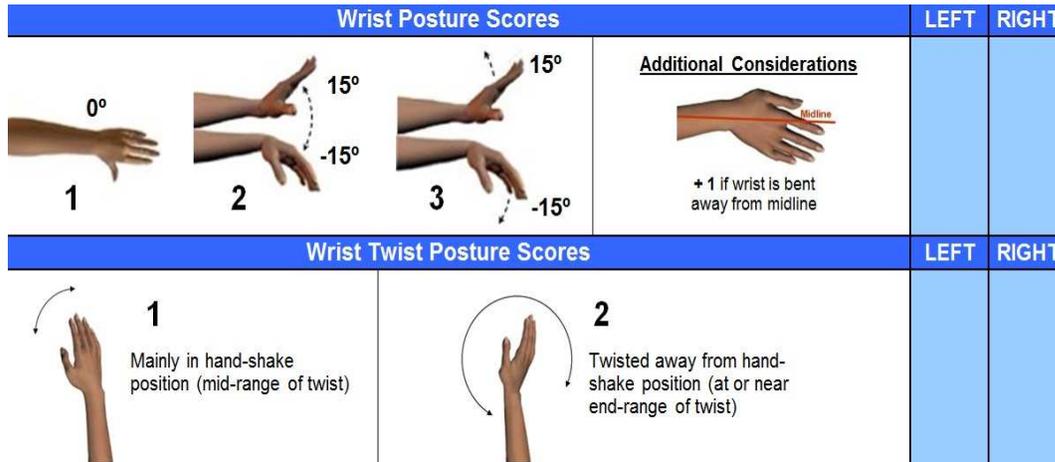


Fig. 8. RULA - The calculation module for the positions (left, right) of the wrist

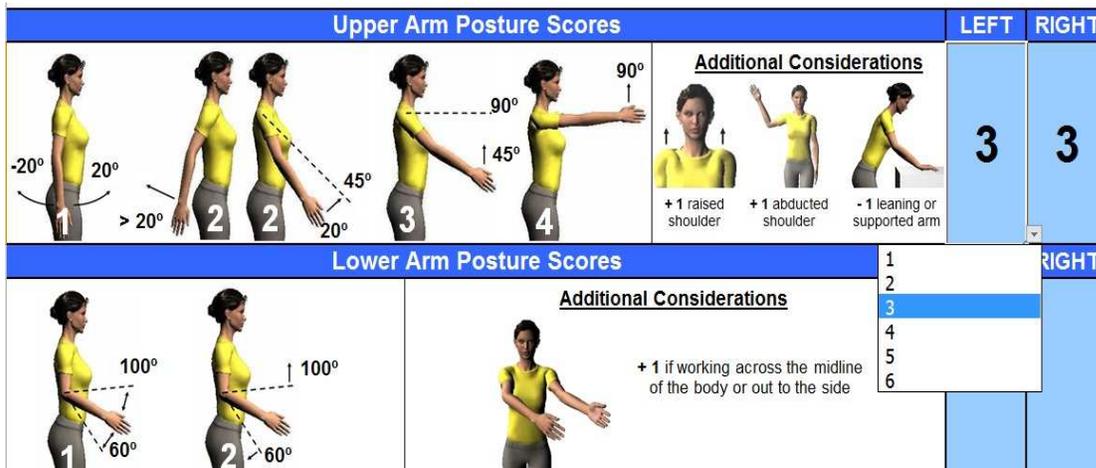


Fig. 9. RULA - Calculation module for combined positions (left, right) of the trunk with upper limbs

Through the RULA procedures were analyzed, in the 5 simulated posts, the position

of the shoulder-neck-head assembly (Fig. 7.a) and the trunk position of the human body (Fig.

7.b) to obtain, respectively, in each case, the posture scores.

Because the analysis also includes the evaluation of the computer user's posture during the activity, the wrist movements were also considered to have a complete picture of the "voltage, stress" points" (left, right) (Fig. 8).

From the point of view of the combined assessments (trunk movement associated with upper limb movement) by the RULA method it is found that a personalized approach should be used carefully (following the user's reactions based on his experience in activity) (Fig. 9).

The second ergonomic evaluation procedure of REBA posts provides a clear calculation of the score and a digital application of framing within normal or not respectively, thus allowing a quick analysis of the situation in which the user is located (Fig. 10.a). After the data for each module of the human body is collected and dotted, the tables in the form (Fig. 10.b) are then used to calculate the variables of the risk factors, generating a single score that represents the level of risk of musculoskeletal dysfunction (MSD). The calibrated values of each procedure are used to frame each analyzed posture in the level of risk obtained and the choice of intervention solutions to eliminate musculoskeletal disorders (example for REBA in Table 2).

From the point of view of the ROSA procedure, the analysis is much more detailed and dedicated to the posture in the sitting position of the subjects with computer activity (Fig. 11.a), respectively at the upper limb level (Fig. 11.b), thus determining a more accurate assessment of the risk of occupational and visual stress, respectively.

These three software applications are based on the method of direct observation and primary measurements related to the angles between the segments of the human body in the sitting position and, respectively, of the digital working device - laptop. For these reasons, the values are evaluated and estimated in relation to the calibrated positions and values of the applications.

4. DISCUSSION

Analyses, from the point of view of the cumulative final score from the summation of the values of the three selected procedures, RULA, REBA and ROSA, the computer postures of the human factor carrying progressive lenses and corresponding to this case study were synthesized in Table 3.

The determined values for the 5 simulated positions are then compared with the calibrated values of the three procedures to identify the issues highlighted in these simulations.

This evaluation and comparison indicate that at that simulated posture and considered the best of all three procedures must intervene.

Thus, posture no. 5 (P5) is considered the best in terms of the risk coefficient evaluated, however, it requires rapid intervention and as soon as possible to adjust and adjust the position of the subject wearing progressive lenses, compared to the laptop.

Table 2

Example of calibrated values of the REBA evaluation procedure scores [13].

| Score | Level of MSD risk |
|-------|---|
| 1 | Negligible risk, no action required |
| 2-3 | Low risk, change may be needed |
| 4-7 | Medium risk, further investigation, change soon |
| 8-10 | High risk, investigate and implement change |
| 11+ | Very high risk, implement change |

Table 3

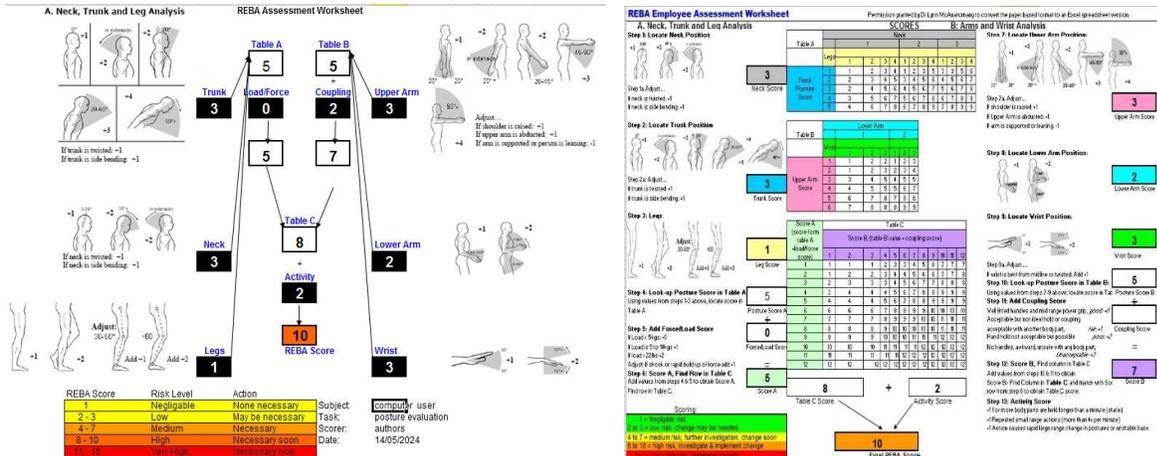
Score values of evaluation procedures.

| | P1 | P2 | P3 | P4 | P5 |
|-------|----|----|----|----|----|
| RULA | 10 | 9 | 8 | 6 | 6 |
| REBA | 14 | 10 | 9 | 8 | 7 |
| ROSA | 15 | 11 | 9 | 9 | 8 |
| Total | 39 | 30 | 26 | 23 | 21 |

Table 4

Calibrated score values in selected applications.

| | Good | Low | Needed | Soon | High |
|-------|-------|--------|---------|----------|----------|
| RULA | 1-2 | 3-4 | 5-6 | 7 | 7 |
| REBA | 1 | 2-3 | 4-7 | 3-10 | 11-15 |
| ROSA | 1-5 | 5 | >5 | >5 | >5 |
| Total | 3 - 7 | 5 - 12 | 9 - >18 | 15 - >22 | 23 - >27 |



a) Example of calculating the score for a complete posture of the subject
 b) The calculation values of the score on each component
Fig. 10. REBA method.



Fig. 11. ROSA method.

These adjustments refer specifically to the position of the upper limbs relative to the support, the precise placement of the glasses on the face to use the progression channel correctly but also adjusting the position of the screen to the vertical.

That is why the values determined for P5 (the posture considered to be the best situation of the five variants) are close to the acceptable level but still require immediate and additional adjustments to create comfort necessary.

5. CONCLUSIONS

The analysis performed on the simulated posture of a computer user and a progressive lens wearer, through the three validated methods, highlights the particular elements that differentiate them, but also the specific characteristics.

Thus, from the evaluation of the risk coefficients determined by the three methods, the one obtained by the ROSA method is the most powerful detail, offering the possibility to identify the critical areas in which one can intervene.

The RULA method is the second useful option in such analyses because it can also include changes in the integral posture of the human body (the standing position or sitting).

Analyses to determine the state of comfort in the case of computer activity of some progressive lens wearers require complex approaches, sometimes specific to a particular personalized requirement or even in cases of evaluations of a stage of recovery or performance increase.

All these general or special aspects (with different degrees of influence) can be constituted, in the future, in forms of testing and evaluation specific to the fields of activities that involve ensuring comfort, thus having the possibility to be compared with calibrated and verified methods.

Through this approach, certain sensitive points in the activity of a sample of workers can be identified more quickly and it is possible to intervene zonally or punctually to avoid the installation of musculoskeletal dysfunctions and

to obtain performance together with the comfort of the activity and the environment.

In future research new postural analysis methods will be considered for testing and validation of the proposed approach, as presented in [14, 15]. In addition, other industrial experiments will be developed in the context of occupational wellbeing awareness campaigns.

6. ACKNOWLEDGEMENTS

In these experiments, we have developed investigations with equipment from Applied Optometry Laboratory and L11 laboratory from Research Institute of Transilvania University. The research is part of the work of Adrian Catalin Lungu PhD student.

7. REFERENCES

- [1] <https://dexonline.ro/>, accessed May 2024.
- [2] <https://www.ergonautas.upv.es/>, accessed May 2024.
- [3] Diego-Mas, J.A., Poveda-Bautista, R.Y Garzon-Leal, D.C., *Influences on the use of observational methods by practitioners when identifying risk factors in physical work*. Ergonomics, 58(10), pp. 1660-70. 2015.
- [4] Kee, D. *Systematic Comparison of OWAS, RULA, and REBA Based on a Literature Review*. Int. J. Environ. Res. Public Health 19, 595, 2022.
- [5] Kong, Y.K., Lee, S.Y., Lee, K.S., Kim, D.M., *Comparisons of ergonomic evaluation tools (ALLA, RULA, REBA and OWAS) for farm work*. International Journal Occup Saf Ergonomics, June, 24 (2), pp. 218 - 223, 2018,
- [6] Neto, I.R., Zanchin, M., Brombilla, D., Andrade, I.F., *Study of Different Ergonomic Methods Aand Their Applications*, Revista Ação Ergonômica - v. 13 n. 1, 2018,
- [7] Roman-Liu, D, Groborz, A., Tokarski, T., *Comparison of risk assessment procedures used in OCRA and ULRA methods*. Ergonomics 56, pp. 1584–1598, 2013.
- [8] Kee, D., *An empirical comparison of OWAS, RULA and REBA based on self-reported discomfort*. Int. J. Occup. Saf. Ergon. 26, pp. 285–295, 2020.

- [9] McAtamney, L.; Corlett, E.N., *RULA: A survey method for the investigation of work-related upper limb disorders*. *Appl. Ergon.* 24, pp. 91–99, 1993.
- [10] Hignett, S., McAtamney, L., *Rapid Entire Body Assessment (REBA)* *Appl. Ergon.* 31, pp. 201–205, 2000.
- [11] Gómez-Galán, M, Pérez-Alonso, J., Callejón-Ferre, Á.J., López-Martínez, J., *Musculoskeletal disorders: OWAS review*. *Ind Health.* Aug 8, 55(4), pp. 314-337, 2017.
- [12] Takala, E.-P., Pehkonen, I., Forsman, M., Hansson, G.-Å., Mathiassen, S.E., Neumann, W.P., Sjøgaard, G., Veiersted, K.B., Westgaard, R.H., Winkel, J., *Systematic evaluation of observational methods assessing biomechanical exposures at work*. *Scand. J. Work Environ. Health*, 36, pp. 3–24, 2010.
- [13] REBA-A-Step-by-Step-Guide, <http://ergo-plus.com/>, accessed May 2024.
- [14] Gajšek, B., Draghici, A., Boatca, M. E., Gaureanu, A., Robescu, D., *Linking the use of ergonomics methods to workplace social sustainability: The Ovako working posture assessment system and rapid entire body assessment method*, *Sustainability*, 14(7), 4301, 2022.
- [15] Choong, S. W. J., Ng, P. K., Yeo, B. C., Draghici, A., Gaureanu, A., Ng, Y. J., ... Selvan, H. K. T. *A Preliminary Study on Ergonomic Contribution to the Engineering Design Approach of a Wheel Loader Control Lever System*, *Sustainability*, 14(1), 122, 2021.

Comparație între metodele de ergonomie aplicate în evaluarea influenței posturii corpului uman asupra nivelului de confort vizual pentru un utilizator de calculator și purtător de lentile progresive

Principiile domeniului de ergonomie aplicate și utilizate în diferite studii de evaluare a comportamentului în stare de confort ca și în studii de oportunitate a identificării unor cauze de manifestare a disfuncțiilor musculo-scheletale sunt din ce în ce mai mult dezvoltate pentru a crea mecanisme eficiente și sigure de analiză pentru specialiștii din domeniu. Astfel, autorii acestei lucrări își propun să analizeze, în raport cu criteriile evidențiate din diferite studii, oportunitatea utilizării uneia sau alteia dintre metodele ergonomice în evaluarea influenței posturii corpului uman asupra nivelului de confort vizual pentru utilizatorii de calculator și purtători de lentile oftalmice progresive. În prima parte a lucrării sunt trecute în revistă unele aspecte, pentru ca în partea a doua să se identifice setul util de metode ergonomice pentru acest domeniu combinat – postura și sisteme senzoriale. În partea a treia a lucrării autorii prezintă un studiu de caz pentru un subiect, purtător de lentile oftalmice progresive și care desfășoară activitate la calculator, cu scopul de a identifica metoda cea mai eficientă, completă și utilă de evaluare a stării de confort. Rezultatele și concluziile reieșite din analiza efectuată sunt prezentate în finalul lucrării.

Adrian Catalin LUNGU, PhD. Student, University Transilvania Brasov, Product design, Mechatronics and Environment Department, email: adrian.lungu@unitbv.ro

Luciana CRISTEA, PhD., Professor, University Transilvania Brasov, Product design, Mechatronics and Environment Department, lcristea@unitbv.ro

Mihaela Ioana BARITZ, PhD., Professor, University Transilvania Brasov, Product design, Mechatronics and Environment Department, mbaritz@unitbv.ro

Cornel DRUGA, PhD., Lecturer, University Transilvania Brasov, Product design, Mechatronics and Environment Department, druga@unitbv.ro

Angela REPANOVICI, PhD., Professor, University Transilvania Brasov, Product design, Mechatronics and Environment Department, arepanovici@unitbv.ro

Serghei RAILEAN, PhD., Associate Professor, Microelectronics and Biomedical Engineering Department, Technical University of Moldova, serghei.railean@mib.utm.md

Anca Ioana TATARU, PhD. Student, University Transilvania Brasov, Product design, Mechatronics and Environment Department, anca.tataru@unitbv.ro

Gyory BODI, PhD. Student, University Transilvania Brasov, Product design, Mechatronics and Environment Department, g_bodi@yahoo.com