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Original article

Labor Gymnastics Program for metallurgical manual shapers

Programa de Gimnasia Laboral para los moldeadores manuales metalúrgicos

Programa de ginástica laboral para modeladores manuais metalúrgicos

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ABSTRACT

Work-related musculoskeletal disorders are a cause of concern for the scientific community, supported by their negative effect on the lives of workers and the productivity of companies. In the metal casting process, manual molders with pneumatic tamper externalize manifestations of these conditions. This led to carrying out a research that aimed to develop a Labor Gymnastics program to contribute to the care of musculoskeletal disorders in metallurgical manual shapers. To collect, analyze and process the data, theoretical, empirical and mathematical-statistical methods were used, including historical-logical, analytical-synthetic, inductive-deductive, systemic-structural-functional, participant observation, survey, interview, documentary review, the experiment, user criteria and descriptive and inferential statistics. The population under study was made up of 19 metallurgical manual shapers, intentionally selected. The diagnosis and theoretical

systematization achieved made it possible to develop a Labor Gymnastics program, in correspondence with the requirements of the molding process, whose effectiveness was verified.

Keywords: effectiveness, Labor Gymnastics, metallurgical manual shapers program, musculoskeletal disorders

RESUMEN

Los trastornos músculo-esqueléticos relacionados con el trabajo constituyen motivo de preocupación para la comunidad científica, avalado por su efecto negativo en la vida de los trabajadores y la productividad de las empresas. En el proceso de fundición de metales, los moldeadores manuales con pisón neumático exteriorizan manifestaciones de estas afecciones. Ello indujo a realizar una investigación que tuvo como objetivo elaborar un programa de Gimnasia Laboral para contribuir a la atención de los trastornos músculo-esqueléticos en los moldeadores manuales metalúrgicos. Para recopilar, analizar y procesar los datos se emplearon métodos teóricos, empíricos y matemático-estadísticos, entre ellos el histórico-lógico, analítico-sintético, inductivo-deductivo, sistémico-estructural-funcional, la observación participante, encuesta, entrevista, revisión documental, el experimento, criterio de usuarios y la estadística descriptiva e inferencial. La población objeto de estudio estuvo conformada por 19 moldeadores manuales metalúrgicos, seleccionados de forma intencional. El diagnóstico y la sistematización teórica alcanzada posibilitaron elaborar un programa de Gimnasia Laboral, en correspondencia con los requerimientos del proceso de moldeo, cuya efectividad fue constatada.

Palabras clave: efectividad, Gimnasia Laboral, moldeadores manuales metalúrgicos programa, trastornos músculo-esqueléticos

RESUMO

As lesões músculo-esqueléticas relacionadas com o trabalho são motivo de preocupação para a comunidade científica, sustentadas pelos seus efeitos negativos na vida dos

trabalhadores e na produtividade das empresas. No processo de fundição do metal, os moldadores manuais com compactador pneumático externalizam as manifestações dessas condições. Isto levou à realização de uma investigação que visavadesenvolver um programa de Ginástica Laboralcontribuir para o cuidado de lesões musculoesqueléticas em modeladores manuais metalúrgicos. Para coletar, analisar e tratar os dados foram utilizados métodos teóricos, empíricos e matemático-estatísticos, incluindo histórico-lógico, analítico-sintético, indutivo-dedutivo, sistêmico-estrutural-funcional, observação participante, levantamento, entrevista, revisão documental, o experimento, critérios de usuário e estatísticas descritivas e inferenciais. A população em estudo foi composta por 19 modeladores manuais metalúrgicos, selecionados intencionalmente. O diagnóstico e a sistematização teórica conseguidos permitiram desenvolver um programa de Ginástica Laboral, em correspondência com as exigências do processo de moldagem, cuja eficácia foi verificada.

Palavras-chave: efetividade, Ginástica Laboral, programa de modeladores manuais metalúrgicos, distúrbios osteomusculares

INTRODUCTION

Musculoskeletal disorders are the most common health problems among workers around the world (Krishan *et al* ., 2022). They are alterations suffered by body structures such as muscles, joints, tendons, ligaments, nerves, bones and the circulatory system caused, aggravated or accelerated by exposure to certain risk factors at work and the effects of the environment in which it occurs. develops (Aponte *et al* ., 2022).

Its most common symptoms are pain, swelling, stiffness, numbness and tingling; musculoskeletal pain is considered the main factor of disability in the world (Soares *et al* ., 2019). Workers in the metallurgical industry, considered a strategic sector of any country, are exposed to a harmful work environment that favors the appearance or exacerbation of the aforementioned ailments. An example of this is the casting process, characterized by two parallel operations: metal melting and mold preparation.

During molding, metallurgical workers, to facilitate copying of the model and obtain the mold, use different tools that generate vibrations. Added to this are incorrect work postures and manual lifting of loads that act detrimentally on the musculoskeletal system of these workers and cause the appearance of musculoskeletal disorders (Guillén *et al* ., 2023).

On the other hand, it has been proven that Labor Gymnastics (LG) is one of the most used types of physical activity worldwide to take care of the personal and productive health of workers (Fedotova & Malakh , 2021 ; Guerasimova , 2020; Lima , 2019).

In social terms, Fernandes & Santos (2019) reported that among its benefits it promotes social relationships and teamwork, improves interpersonal relationships, awakens the emergence of new leadership and promotes social integration. From a psychological point of view, it can reinforce the worker's self-esteem, provide awareness of the importance of their work for the company, change the work routine, improve the ability to concentrate on activities; in addition, combat emotional tension and reduce mental stress levels.

Also, physiological benefits are inherent to it, including increased blood circulation, improved oxygenation of muscles and tendons, reduced lactate accumulation that causes muscle fatigue, improved posture, and avoids unnecessary efforts during the execution of tasks, it reduces inflammation, trauma and muscle tension; which limits the incidence of musculoskeletal disorders and, therefore, improves quality of life.

For this reason, it was deepened with a search in the sources of scientific information. It was found that Dantas & Alves (2022) compiled 13 studies where they confirmed the effectiveness of using LG in the painful symptoms of musculoskeletal disorders related to work, which were published in the Virtual Health Library (VHL), Research Gate, US National Library of Medicine (Pubmed) and Scientific Electronic Library Online (Scielo). The authors found eight research in which only LG was used and five that validated its positive effects in association with other therapies.

These proposals were made up of physical exercises for flexibility, stretching, muscular strength, rhythm, coordination, agility and endurance, and were aimed at office and

university workers, health, manufacturing and administrative personnel in a steel company. However, no antecedents of studies were found in the productive sector, in particular, with workers belonging to group C of professions, which includes metallurgical manual molders.

The professions grouped here require physical tension, they intervene in the varied work movements and large muscular planes of all segments of the body, with a predominance of muscular contractions (Khalimov *et al* ., 2018), they are developed with a marked influence of industrial risks, such as high temperatures, danger, vibrations and excessive noise.

It is very difficult for the professions in this group to carry out long-term physical activities during the work day, given the difficult conditions that distinguish them. Therefore, LG becomes an ideal activity due to its compensatory value and the short duration of its duration.

The epistemological journey carried out shows the limited theoretical modeling for the care of musculoskeletal disorders in metallurgical manual shapers through physical exercise, with a comprehensive and contextualized approach. Based on the above, a factual diagnosis is made in the Cuban metallurgical context, based on observation of the molding process and surveys of manual metallurgical molders, which make it possible to detect manifestations of musculoskeletal disorders in them.

The given situation led to the development of a study whose objective was to develop a LG program to contribute to the care of musculoskeletal disorders in metallurgical manual molders, whose effectiveness was necessary to verify.

MATERIALS AND METHODS

The study was developed at the Holguín Mechanical Company during the period January-October 2021, with a mixed and experimental approach, and the selection criteria were assumed to be: working as a metallurgical operator for two or more years, not having a diagnosed muscle-skeletal disease, not performing physical exercises frequently and showing voluntariness to participate in the research by signing the informed consent. The

population studied was made up of 19 metallurgical manual shapers subjected to a LG program to address the manifestations of musculoskeletal disorders from Physical Culture.

The research was aided by scientific methods.

Theoretical ones:

- Historical-logical: made it possible to analyze the background and trends of the detected problems.
- Analytical-synthetic: allowed to analyze, synthesize and interpret the information obtained from information sources and data collection.
- Inductive-deductive: in the interpretation of data and establishment of essential logical relationships of the investigative process.
- Systemic-structural-functional: it was used in the conception and structuring of the program.

Empirical:

- Structured observation: made it possible to identify the postures adopted and the muscle groups most used during the molding process with a pneumatic tamper, for which the corresponding observation guide was prepared.
- Interviews with CPA methodologists and teachers from the base link: to obtain information about the LG program and its impact on the care of work-related musculoskeletal disorders.
- Document review: facilitated the review of scientific articles, theses, the LG program in force in Cuba and methodological documents of interest for research.

To collect the data, internationally validated instruments were used (Kuorinka `s Standardized Nordic Questionnaire and Numerical Rating Scale) that have demonstrated their power in various research contexts.

- Surveys: made it easier to determine the most affected body segments and the intensity of pain in each area. The Kuorinka Standardized Nordic Questionnaire was

used to locate the anatomical areas where some type of ailment is reported that has not yet been diagnosed as an occupational disease. The Numerical Rating Scale instrument made it possible to determine the intensity of pain. It consists of a horizontal line numbered from 0-10 at the ends of which are the extreme expressions of a symptom (0 is the absence, 1-3 mild pain; 4-6, moderate; 7-10, intense; 10 is considered the maximum imaginable pain). The subject selects the number that best evaluates the intensity of the symptom.

- Experiment: the pre-experimental variant was used in a single group, with pre-test and post-test to verify in practice the effectiveness of the designed program.
- User criteria: allowed the feasibility of the program to be assessed through a survey of the introducing users and the Iadov technique was used with the receiving users to determine group satisfaction after its implementation.

Mathematical-statistics:

The information processing was carried out with descriptive statistics methods that allowed the data obtained to be analyzed and described. Objectivity in the data analysis was guaranteed through inferential statistics, with the application of the parametric t'Student test and the non-parametric Wilcoxon Signed Rank test (*pd" 0.05*), in populations of size $n < 20$, based on the statistical comparison of the average ranges in the initial (pre-test) and final (post-test) evaluation, to demonstrate the existence or not of significant differences.

RESULTS AND DISCUSSION

Five observations were made of the molding process on different days and times of the work day with a different operator. It was found that they do not perform joint movements before starting work; it was found that, of the 8 hours of established work, the observed process is executed cyclically for 5:30 minutes.

The review carried out on the LG program in force in Cuba allowed to detect deficiencies from a structural point of view; it does not clarify how to carry out the physical diagnosis of workers, how to proceed to select the type of gymnastics and its appropriate location in

the work schedule. The exposed elements led to express that it is limited to insufficient methodological indications to precisely guide Community Physical Activity (CPA) professionals, both experienced and novice, in the planning and delivery of the program in question.

The interviews carried out with two CPA methodologists and 72 teachers from the base link contributed to corroborating the insufficiencies found in the current LG program, through the documentary review that limit the attention to musculoskeletal disorders in metallurgical manual grinders.

On the other hand, the survey of the shapers allowed to identify a population with an average age of 51 years. Regarding working time, the average was 22 years. It was found that 100% of the studied population had a prevalence of musculoskeletal pain. The highest frequency was located in the hand/arm and dorsal/lumbar back system, although it is true that there were reports in other anatomical areas (see **Table 1.** and **Table 2.)**. It was found as a regularity that between 5-6 years of work, painful manifestations begin to be revealed in them, with musculoskeletal disorders.

The information obtained also made it possible to determine the guiding movements, muscular planes most used in the molding process with the pneumatic tamper, select the exercises to develop the complexes and appropriately place the LG in the work schedule.

The analysis of the research background and the diagnostic results made it possible to corroborate the need to develop a LG program to contribute to the care of musculoskeletal disorders in metallurgical manual molders.

The program developed, through the orderly and substantiated projection of parts or activities, is a type of scientific result that allows emphasizing a better way to carry out LG in a metal foundry workshop. Consequently, its structuring is characterized by being a contextualized, methodical and organized process in stages that lead to a series of theoretical-practical contents, combined with the available means, methods, evaluation and

bibliography, as well as the measures necessary for its effectiveness and optimal realization, the synthesis of which is presented.

Labor Gymnastics Program for metallurgical manual shapers

General objective: address from Physical Culture the manifestations of musculoskeletal disorders in metallurgical manual shapers.

LG Tasks:

- Prepare for short and long term work.
- Increase work effectiveness.
- Restore work capacity during and after completion.
- Prophylaxis of unfavorable factors as a consequence of professional work.
- Form a conscious and creative relationship towards work.
- Educate the work and social activity of people.

Program duration: 12 months.

Duration per session: 7-10 minutes.

Frequency: every day of the week.

Theoretical contents. Elementary notions about the musculoskeletal system (name and location of muscle groups and joints most used in the molding process). Importance of physical exercise inside and outside the work context. LG, its impact on personal and productive health. Self-care as a health strategy and disease prevention in personal and work life. The posture inside and outside the work context. General physical, compensatory and relaxation exercises. Forms of execution. Arguments about the need to incorporate the systematic practice of physical exercises as part of a healthy lifestyle.

Practical contents. Joint mobility, stretching, coordination and compensatory exercises, for different body segments; breathing and relaxation exercises.

Types of LG. It is recommended to use four forms for metallurgical manual shapers:

- Introduction (group).
- Pause or compensatory (group or individual).
- Micropauses (individual).
- Relaxation (group).

Introductory: at the beginning of the work day, to prepare the body and create a good disposition to face productive tasks. Its objective is to condition the muscular structures and joints that suffer the greatest impacts during work, acting preventively to avoid the occurrence of accidents and occupational ailments. It is suggested that the exercise complex be composed of extension exercises for the trunk muscles, combined with twisting and flexion; combined exercises for the arms, trunk and lower extremities; coordination of movements; specific exercises; marching in place, easy jogging and breathing exercises.

Pause or compensatory (group or individual): at intervals of the work day to interrupt operational monotony, compensate for repetitive efforts and functional balance, exercise antagonistic muscles and relax muscle groups that may have been overloaded. It aims to reduce tensions in the work environment and postural vices. To develop the complex, it is advisable to use stretching, compensatory exercises in the different body segments, individually for each shaper.

Micropauses (individual): performed repeatedly and unconsciously by the operator, as a reflex to reduce fatigue of the main muscle groups involved in production. Dynamic, isometric muscle tensions, muscle relaxation, head or eye movements, breathing exercises, self-massage techniques, walking, etc. are performed in an approximate time of 10-30 seconds.

Relaxation (in groups): practiced after the work day, it promotes muscle and mental relaxation of workers, releasing tension and fatigue accumulated in the different regions of the body. The objective is to oxygenate the muscular structures involved in daily tasks, avoid the accumulation of lactic acid, prevent injuries and assist in respiratory activity.

Stages. **I- Diagnosis**

Goals:

1. Socio-demographically characterize the labor group of metallurgical manual molders.
2. Determine the guiding movements and postural situations adopted by manual metallurgical molders with the pneumatic tamper.
3. Identify the most affected body segments.
4. Define the time in which the manifestations of musculoskeletal disorders appear to place the LG in the work schedule.

Content: Kuorinka Nordic Questionnaire and Numerical Rating Scale.

Duration: two weeks.

II- Adaptation

Goals:

- Raise workers' awareness of the need for self-care and the practice of physical exercises in the workplace.
- Familiarize themselves with the technique of the exercises and their execution in a group, until developing skills in the MMM for later performance individually.
- Progressively begin the sessions guided by the activists under the supervision of the CPA teacher.
- Develop motivation strategies that encourage MMM adherence to the program, with emphasis on self-care.

Duration: four weeks.

Recommended frequency: every other day, twice in the first two weeks, three times in the last two.

III- Maintenance

Goals:

- Consolidate and master the technique and order in the execution of the exercises.
- Systematically execute the complex of exercises, in groups and individually.
- Achieve a high degree of participation and satisfaction in classes.

Duration: eight months.

Recommended frequency: five times (every work day).

Methods: verbal, explanatory-demonstrative and repetitions.

Procedures: frontal, dispersed or other that the teacher considers appropriate.

Organizational forms: use both group and individual work.

Means: ropes, canes and others of free creation.

IV - Evaluation

The indicators were taken into account:

1- Impact on health.

- Affected anatomical area (Nordic Questionnaire).
- Pain intensity (Numerical rating scale).

Evaluative scale: decreases, stays the same, increases.

2- Monitoring of the program.

- Group satisfaction (Iadov test).

Evaluation scale 1 and - 0.5 dissatisfaction; - 0.49 and + 0.49 contradiction, 0.5 - 1 satisfaction.

Methodological guidelines:

- The preparation of CPA teachers and activists to implement the program in the company is carried out through improvement courses or other forms of training such as workshops or seminars. It is recommended to develop the topics: Musculoskeletal disorders related to work in metallurgy: causes and consequences. LG as a way to prevent work-related musculoskeletal disorders. Self-care as a prevention strategy.
- In training, the topic of self-care as a prevention strategy should be taught to shapers in a workshop format, with the purpose of exchanging knowledge, experiences, reflecting, debating the topic critically and applying it in the work setting to make their transformative action possible.
- The preparation of activists is essential to guarantee adequate systematization, since vacations are biweekly, not everyone enjoys them at the same time.
- The theoretical contents that are not developed in the established forms of training and improvement are addressed during the execution of the exercise complexes.
- To carry out any form of LG and guarantee its necessary systematization, the exercise complexes prepared by the CPA teacher can be recorded on videos with the activist and a WhatsApp group can be created among the operators to benefit from the technology.
- CPA teachers must ensure strict demonstration and correction of errors from the first classes; guarantee complex changes every 15 days.
- Exercises for shoulder joint mobility should be performed first from the initial position with arms down flexed at the shoulders and then working with arms extended. In this way, resistance due to rigidity is overcome, while the amplitude of movements is gradually increased.
- For coordination, it is advisable to perform simple exercises with multiple or combined influence because they increase motivation and concentration of attention.
- The specific exercises selected can be performed with or without implements, but due to their structure they must be similar to the main movements performed by shapers with the pneumatic ram.

- LG sets must be made up of exercises with a logical, fluid sequence, where the final position of one is as much as possible the initial position of the next.
- It is recommended to dose the exercise sets by time, due to the brevity of the LG and to pay attention to individual differences.
- The selection of methods, procedures and organizational forms must be carried out after analyzing the workplace and personal characteristics of the shapers.
- The CPA teacher must develop his creativity to use means such as sticks, ropes, walls, small balls and others, to motivate practice; It is advisable to involve the operators in its preparation.
- Relaxation can be done in the workplace or locker area, before bathing.

Results of the theoretical assessment

The feasibility of the LG program was verified with the user criteria method, used in various studies related to Physical Culture. For this purpose, 16 introductory users were intentionally selected (two CPA teachers per base link in the municipality) who met the established inclusion criteria. For them, a questionnaire was developed with the evaluation scale: (5) strongly agree, (4) agree, (3) neither agree nor disagree, (2) disagree, (1) strongly disagree.

The questionnaire was composed of items related to the structure, functionality, real possibility of application and practical usefulness of the LG program to contribute to the care of musculoskeletal disorders in metallurgical manual molders.

It was found that the majority of the introductory users (15) expressed the criterion of strongly agreeing (93.75%) with the elements that relate the structure and functionality of the LG program. 81.25% (13) said they strongly agreed that its application is possible in the given work context. Regarding its practical usefulness, 100% stated that they strongly agreed with its contribution to the primary care of musculoskeletal disorders in metallurgical manual shapers from Physical Culture.

100 % of the introductory users considered that the LG program developed promotes healthy habits with the practice of physical exercise in the workplace and promotes awareness and incorporation of self-care as a way to prevent occupational diseases. They assessed the proposal as feasible, novel, necessary and contextualized.

With these criteria, the program was implemented and its effectiveness evaluated, using the indicators: impact on health and monitoring.

Indicator results, impact on health

Location of painful areas

Table 1 shows a comparison between pre-test and post-test by body area that corroborates the favorable changes experienced by the 19 shapers.

Table 1. *Distribution of shapers by painful anatomical area reported in pre-test and post-test.*

Painful areas	Pre-test	%	Post -test	%
Neck	6	31.58	6	31.58
shoulder	17	89.47	15	78.94
elbow/forearm	16	84.21	15	78.94
hand/wrist	18	94.74	18	94.74
back/lumbar	17	89.47	16	84.21
knee	9	47.37	7	36.84
ankle foot	4	21.05	4	21.05

Pain intensity

Regarding the intensity of pain (see Table 2), the positive changes recorded for each painful area in pre-test and post-test are shown. It should be noted that in no case was an increase in pain intensity reported.

Table 2. *Comparison between pain intensity in pre-test and post-test.*

Anatomical zones	Pre-test Average	Post-test Average
Hand/wrist	5.53	3.89
Elbow/forearm	4.89	3.84
Shoulder	5.21	3.84
Neck	1.42	1.05
Dorsal/lumbar	5.74	4.26
Knee	2.63	1.95
Ankle foot	1.05	0.74

Kolmogorov-Smirnov and Shapiro-Wilk test was applied, the result showed normal distribution in the hand/wrist area, so the parametric T test was applied in the elbow/forearm, shoulder, dorsal/lumbar, knee and ankle/foot, as they did not have a normal distribution, the non-parametric test of signs with Wilcoxon rank was applied for two related samples. For both, a significance level of "=0.05 was established.

As a result of the data processing using the SPSS 22 processor, the value obtained (Sig. Asymptotic (bilateral)), except in the ankle/foot area , as this was less than the established one, allowed to reject H_0 and accept the positive influence of the program for the care of musculoskeletal disorders in these affected anatomical areas (see table 3) .

Table 3. *Inferential statistics of the Wilcoxon Test*

Anatomical zones	Elbow/ forearm	Shoulder	Neck	Dorsal/ lumbar	Knee	Ankle foot
Z	-3,407b	-3,376b	-2,333b	-3,573b	-2,739b	-1,857b
Asymptotic sig. (bilateral)	.001	.001	.020	,000	.006	.063

Test statistics

a.) Wilcoxon signed rank test b. It is based on positive ranges

Indicator results, program monitoring

In order to assess satisfaction with the applied LG program, the 19 metallurgical manual molders who made up the population of this study were considered as recipient users and intentionally selected. It was decided to use the Iadov technique, a validated instrument used in different research contexts, since it allows calculating the individual and group satisfaction index (ISG). The original questionnaire was modified, in accordance with the purposes of this research.

To obtain the ISG, it is operated with the different levels of individual satisfaction, expressed on the numerical scale that ranges between +1 and 1. The answers to the open questions included in the questionnaire allowed to corroborate a favorable trend, according to the results obtained in the satisfaction index. The individual results showed clear satisfaction of 16 metallurgical hand shapers (84.21%) with the LG program.

The result obtained, by solving the indicated mathematical operation, is an ISG of 0.89; and it was interpreted as a positive evaluation by the operators, because the resulting value was found in the range between 0.5 and 1, which indicated a high degree of satisfaction.

By comparing the research findings with others found on the topic, the relevance of introducing LG physical exercises in the workplace in a contextualized manner is reaffirmed. In their studio, Shariat *et al.* (2018) found significant differences in pain scores in the neck, right shoulder and lumbar area, both in a group with ergonomic interventions and in those who performed LG. A significant improvement in pain is observed between the fourth and sixth month only in the group that does stretching exercises. These findings coincide with those of Granzotto *et al*. (2019) who also reported that LG prevents musculoskeletal disorders, reduces stress levels at work, and no adverse effects were reported among the participants.

For its part, the effect of an active and static stretching program with a view to reducing musculoskeletal pain in nursing personnel is evaluated by Silva et al. (2020). Researchers apply exercise sessions in the workplace for two months at a frequency of three times a week. To measure pain, they use the numerical rating scale that is performed before, shortly

after, and at the end of the program. They conclude that stretching produces positive acute and chronic effects in reducing pain (p = 0.001).

Meanwhile, Cuesta *et al* . (2022) carried out a study with a mixed approach in sedentary workers, using the body mass index formula and the International Physical Activity Questionnaire, to design a LG program in four phases, namely: dissemination and promotion, adaptation, motivation and internalization and, finally, stress management, in 15-minute sessions. The proposal is evaluated favorably by the expert criteria method, although no data on its application are reported.

The aforementioned research differs in the context, because the population of shapers carries out considerable physical work activity as previously explained; Therefore, the main perceived difference is in the duration of the sessions. In the case of molders, the LG must be brief and of low intensity, since it cannot become an additional physical load to that represented by the molding process.

CONCLUSIONS

The diagnosis and theoretical systematization achieved made it possible to develop a program of LG for manual metallurgical molders, in correspondence with the requirements of the molding process, whose effectiveness was verified.

It is concluding the consensus of the introducing users regarding the feasibility of applying the developed LG program is conclusive. Likewise, due to the results of its implementation, it contributed to the care of musculoskeletal disorders in metallurgical manual molders.

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The author declares that there are no conflicts of interest.

Author's contribution:

The author is responsible for writing the work and analyzing the documents.