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The Artists' Posture during Restoration Work. Implications to Health and Correction through Exercise

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Abstract

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The idea for this paper came while observing the body position of the students specialized in the *Restoration of mural paintings* when working on a church fresco.

The aim of this study is to inform and prevent the restoration artists about the column deficiencies that may occur during the work and over the functional status of the vestibular apparatus responsible for balance (when working at heights). Even more, we provide the restoration artists with exercise programs to prevent or ameliorate the detected deficiencies.

Also included is a study derived from practical applications, done with the help of students specialized in the *Restoration of mural paintings* from the Faculty of Visual Arts and Design, from the University of Arts “George Enescu” from Iași. The study in the form of a workshop is comprised of the evaluation of the vertebral column by a group of MA students from the Physical Therapy department of the Faculty of Physical Education and Sport at the University “Alexandru Ioan Cuza”, who compiled sets of physical exercises specifically designed to combat the conditions that were found and put them in practice in individual work programs.

With this study we aim to inform the present students, restoration artists, but also the future students who choose this specialization, about the possible installation of column deficiencies due to the working conditions they expose to in some cases.

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Keywords: Restoration; artists; vertebral column; corrective physical exercises.

1. Introduction

This paper deals with the field of sociology, sub-field: *Social security and public health*. We considered that social security and the concerns for health of the restoration artists must be made public through a notice from the society and education system through the dissemination of information and practical methods.

1.1 Professional theoretical framework

The restoration of a mural painting is done in several stages, in a relatively long time. Depending on the pictorial ensemble of a monument, the restoration activity can last years. If the restoration is carried out in a laboratory, on fragments that were extracted from a mural painting ensemble, the work of the restorer can span over weeks or months. The restoration of a mural painting requires a first stage of tests through which it is establish the extent of deterioration and the adherence of sediments, then move on to the next steps that in which the artists intervenes with various chemical solutions, that need a specific time of action.

In this context, if we take into consideration the architectural particularities of the frame of the mural painting (for a church for example), the work of the restorer will involve the adoption of some positions of the body that are difficult, most often damaging the spine. Working on a dome for example, the cervical spine will remain extended for long periods of time. On the underside of windows where jambs are present, the entire spine executes lateral movements. When working in the laboratory, the cervical spine can remain flexed for long periods of time. These conditions of the profession can create, in time, bad habits that can lead to the development of conditions to the spine.



Fig. 1. Students during restoration work at a mural paintings at Sf. Nicolae Church in Dorohoi (A, B, C), Golia Monastery in Iași (D), photography made by Raluca Minea.

In the picture entitled 1A an intervention to fixate the pigment can be observed. The work is done in difficult conditions, with the use of chemicals, on a scaffolding, in a limited space. This technique involves applying a paper paste soaked in a chemical substance. Working on the dome, the position of the student's body is dictated by the limitations of the space. In the second one we can observe an intervention in which a chemical solution is injected into the unstable grout layers in order to increase the adhesion, or in the case of deformation of the surface layer (*intonaco*). The third image depicts a student in the process of filling the gaps caused by the lack of adhesion or cohesion between the layers of grout. There are also gaps produced on the layer of paint as a consequence of surface flaking or exfoliation. In the last picture we can observe another laborious stage in the restoration process of a mural painting, namely chromatic integration. This technique requires a long time to complete because the work is done with a very thin brush that has to be applied on each gap or sheer (Fig. 1). Again we can observe that the position of the body is dictated by the limitations of the space, as the female student works on an arch above the door.

Artists in general are prone to injuries of the spine due to the bad postures held for long periods of time during work.

In the same context it can be integrated the work of other artists, especially those from the specialization of sculpture and mural art, but also musicians, especially those instrumental performers who are forced to adjust their body postures depending on the requirements of work.

Both incorrect postures but also the correct ones held over long periods of time will cause severe muscle contractions with negative consequences on the normal functionality of the organism. In this regard, we come to the aid of the young artists with theoretical and practical recommendations comprised of programs for physical activities and rehabilitation exercises.

Conditions of the cervical spine that may occur:

- Pains caused by bad posture (due to abnormal positions of the neck);
- Acute pain that occurs as a result of sudden movement of the head and neck, with the pains being felt in the arms and cervical area;
- Cervical spondylosis that occurs over time – most often between C5-C6 vertebrae.

We note that the most exact examination of the spine is the radiological exam.

The action undertaken by us was done in a workshop, having as main goal informing the students of the spine deviations that can appear as a result of bad postures of the body for long periods of time. Another priority was to showcase a series of corrective and preventative physical exercises related to some conditions of the vertebral column.

1.2 Medical theory

The vertebral column represents the axial skeleton of the body and forms. It has a strategic position in the functional structure of the body because it is organized concentrically to the neuro-spinal area. The adult spine consists of 24 mobile pieces called vertebrae between which are found intervertebral discs and other conjunctive organized structures which facilitate complex articulations (Antohe, et. al., 2012, p. 57).

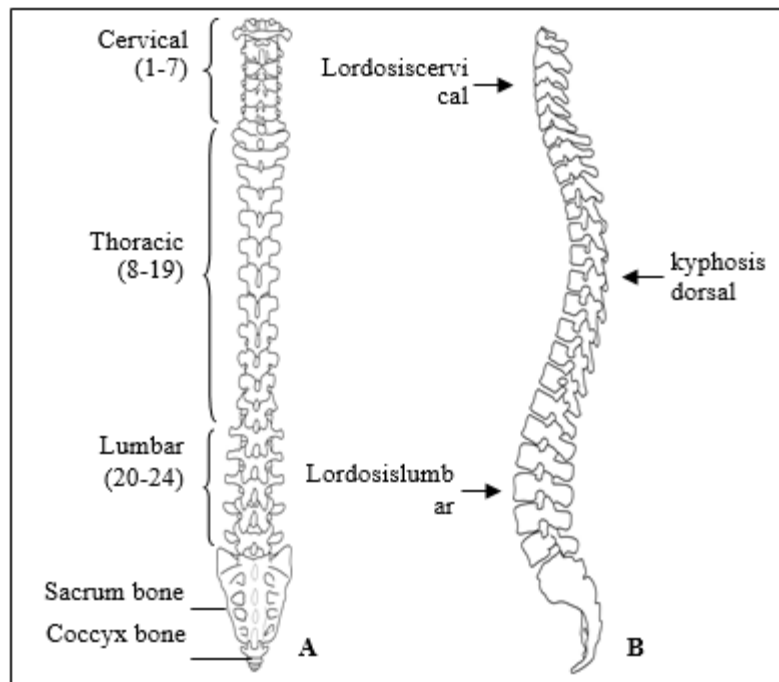


Fig. 2. Vertebral Column (drawing by RalucaMinea).

The intrinsic elasticity of the backbone is due to the physiological curvature. The areas of mobility, convex anteriorly in nature, are called lordoses, have a cervical and lumbar curve and are connected through an intermediary segment to the thoracic curve, convex forward, named kyphosis. The curves of the vertebral column in the anterior are called scoliosis, and are defined by the location and direction of the curve.

The deviations of the spine or the deviations of the vertebral axis are conditions caused by various etiopathogenic factors. The lateral deviation can be of many types, caused by bad posture or by certain work conditions. This temporary lateral deviation of the spine does not represent scoliosis, but an unhealthy attitude that may facilitate it (Fig. 2) (Antohe, et. al., 2012, p. 56). In such a context, the body positions adopted for prolonged time, due to the spatial limitations mentioned above, are conditions for the installation of spine impairments.

The main objectives in case of impairments are: improving the mobility of the spine; improving the posture; strengthening of the back and abdomen muscles; improving respiratory function; the general training of the body.

2. Material and method

The subjects gave their consent to participate in this study, all the individual data being confidential.

2.1 The study material includes:

- Experimental segment;
- Assessor segment;
- Instruments for evaluating the postural and balance deficiencies (plumb bob, tennis balls, stopwatch);

- Brochures and programmes of medical gymnastics in specialized literature.

The experimental segment consisted of 3 groups of students of 20 students in each group, the years I, II and III mural restoration specialization within the Faculty of Visual Arts and Design, from the „George Enescu" University of Arts, Iași.

The assessor segment was represented by a group of 10 students at master degree, 10 students from the Physical Therapy department at the Faculty of Physical Education and Sport at the „Alexandru Ioan Cuza" University in Iași.

2.2 The methods

2.2.1 The methods utilized in our study to detect conditions to the spine along with balance disorders were:

a) Medical history - Collecting the genetic data of the family members and of the data relating to subjective complaints concerning conditions to the spine.

b) The lead wire test. This is a quick visual test that checks if the spine is vertical. In the case of a patient with scoliosis for example, the lead wire that is based on the C7 cervical vertebra will either lean towards right or left in relation to the centerline.

Through the assessment methods of the spine used in our study we detected hereditary or installed conditions at subjects who have deficient working positions for a long time. According to the results of these methods there have been established individual exercise programs.

2.2.2 Methods of testing the balance (static and dynamic):

a) Detecting the static balance through method: by standing on one foot on a 5 cm wide line on the floor, with the other leg bent, hands slightly distanced from the body, eyes closed – and maintaining this position for at least 15 seconds;

b) Detecting the dynamic balance through method: picking up 10 objects (tennis balls) placed on the ground over a distance of 10 m on a line 5 cm wide. The test requires walking on the line and picking up the balls – the lateral deviations of the subject from the line are noted and scored. A scoring system of 0-1-2 is used (0 = incapable; 1 = completes with difficulties; 2 = completes without difficulties).

The methods for verifying the static and dynamic balance provided data regarding the safety of subjects when working at heights, on scaffolding.

3. The results of the tests

Table 1. Test 1 – Medical history -

	Number of cases	Percentage
Knew about pathology	3	1,8 %
Did not know about pathology	57	34,2 %
Total No. Of subjects	60	100%

Table 2. Test 2 - The detection of scoliosis and kyphosis

Scoliosis			Kyphosis			Normal parameters		
year I	year II	year III	year I	year II	year III	year I	year II	year III
2	4	5	3	3	6	15	13	9

Table 3. Test 3 Static balance (a)

year I		year II		year III	
No. of Subj.	Score	No. of Subj.	Score	No. of Subj.	Score
4	0	4	0	1	0
9	1	9	1	10	1
7	2	7	2	9	2

Table 4. Test 3 Dynamic balance (b)

Year I		Year II		Year III	
No. of Subj.	Score	No. of Subj.	Score	No. of Subj.	Score
1	0	0	0	0	0
2	1	3	1	2	1
17	2	17	2	18	2

4. Practical means to prevent and treat conditions of the spine and balance

Restorers work in standing and sitting positions, often adopting a pose with a curbed back, with a static and dynamic muscular effort, with high and continuous tension of the nerves, and use of the upper limbs. The physical exercises recommended must be chosen from the category of those that are designed to act on the neck, on the arms, on the back, on the abdomen, on the upper limbs but also on the lower limbs that are less engaged (Teodoru Şuiu, 1985, p. 12).

There is easy access to viewing the type of physical exercises required through the use of the internet, however, we note that it is necessary to seek the recommendation of a physiotherapist when choosing the most appropriate exercises depending on individual needs.

The physical means of work for the subjects were selected from the specialized literature by kinetotherapist students. From the given exercises there were designed individual work programs that have been demonstrated during this study. Brochures were printed with work programs for each detected deficiency. The brochures also contain theoretical information.

4.1 Physical exercises for increasing the mobility of the vertebral spine

The influence of the physical exercises on improving the deficiencies of the column and on their prevention through the strengthening of the muscles of the thorax has been proven out. Under the action of well-conducted medical physical exercise, these deficiencies of the column can be prevented and treated at this category of professions. Thus, in order to increase the mobility of the column, the most efficient exercises are those for extension, flexion and stretching at the level of those muscle groups used by restorers in their profession.

We consider to be highly important to give examples of medical exercises composed by specialists in kinetotherapy and sports medicine (TeodoruŞuiu, 1985, p. 12) in order to reach the persons to whom it may be useful but also to compose similar exercises depending on the needs:

1. Standing with the legs spread apart: bending forward, flexing, and vigorously extending the arms in different positions (to the shoulders, back of the head, hips, stretched forward, upward).
2. Standing with the legs spread apart: bending forward while rotating and extending the upper body towards the left leg and then towards the right leg.

3. Standing with the legs spread apart: bending forward and grabbing the ankles.
4. Closed standing stance: same motion as in the previous exercise but with the swinging of the arms and with a slight bending of the knees.
5. Standing with the legs spread apart: rotations of the upper body with different positions of the arms, with the most ample rotation being the one with the arms stretched upward.
6. Standing with the back to a fixed ladder with the arms stretched upward while grabbing a step of the ladder – totally extending the body and then bending it forward alternatively.
7. Standing with the back to a fixed ladder: crawling up in a ball, grabbing the first step, stretching the knees and repeating.
8. Standing with the back to a fixed ladder: grab the step that is at eye-level and swing your body towards right and left while the feet stay in the same position.
9. Sitting: stretch the arms upward, and bend the upper body forward while swinging the arms backwards.
10. Sitting with the hands on the back of the head: extend the upper body and bend it forward while keeping the hands on the back of the head.

These exercises are meant to increase the joint mobility and are recommended to artists in the field of restoration (and not only) who show deficiencies to the vertebral column. The principles and rules that are at the basis of medical gymnastics must be respected and the final goal must be to gain the mobility necessary to perform the professional activities.

4.2 Physical exercises for increasing core muscle strength

The correction of the vicious position of the column and the amelioration of the painful symptoms can be obtained by toning the muscles of the torso. A proper functioning of the back muscles reduces the risk of injuries, decreases the stress and fatigue installed at this level.

The exercises to increase the muscle strength of the core consist in free, active, slow movements, while flexing, or with dumbbells, etc., and in movements made in the opposite direction of the force of gravity. It is recommended that exercises with muscular isometric contractions are also performed.

The following examples (Birtolon, 1978, pp. 92-95) may precede new exercises composed by the beneficiaries:

1. Standing with the legs spread and the hands on the back of the head, flexing the core: correcting the position of the back and maintaining the stance.
2. Standing with the legs spread and the hands on the back of the head: lean and bend the upper body while flexing and then return to the initial position.
3. Standing with the legs spread: bend the upper body and maintain the position.
4. Standing with the legs spread and the hands on the back of the head: extend the core while flexing.
5. Sitting with the back straight (normal position): slowly move the arms.
6. Laying on the back: slowly raise the legs until vertical.
7. Laying on the back: raise the upper body until the vertical position and maintain the stance.

8. Laying on the back with the legs under a fixed ladder: slowly raise the upper body until the sitting position is reached while stopping in different positions along the way.

9. Hanging with the back to a fixed ladder: raise the legs, bent or stretched, until they are horizontal and maintain the position.

10. Standing with the legs slightly spread, lift one dumbbell that weighs 2-3 kg with the left hand laterally until it reaches a horizontal position (10-15 exercises) then repeat with the right arm.

4.3 Exercises for increasing the static and dynamic balance

By developing the balance we aim to develop the posture reflexes; developing the capacity for orientation in space of the body and its segments, developing courage and self-confidence. Also, it is aimed to prevent the falls from height that generate fractures.

The re-education of the balance in an upright standing position and also of the body movements consists in the completion of several special exercise programs for walking, for maintaining the body in different positions, with or without auxiliary support.

The following models of exercises can vary in a wide range of physical means adjusted to the available materials and the specificity of the situation (Vaida, 2011).

1. Different methods of walking in a straight line: walking forward while stepping on the line with the whole foot; walking backwards while stepping on the line only with the heel; walking forward with the eyes closed.

2. Standing on one foot on the gymnastics bench, with the other leg stretched forward (laterally, backwards, etc), arms stretched to the side;

3. Leaning forward while standing on one foot, while raising the arms laterally (up, back, etc);

4. Standing on the toes, on the ground or on the gymnastics bench, and maintaining the position for 10-15 sec.;

5. Crouch walking forwards for backwards with the arms in different positions;

6. Walking on the narrow side of the bench while throwing and catching a ball;

7. Different applied courses.

8. Jumping rope in all variations – forwards, backwards, with the legs crossed, with the legs together, on one leg.

9. Laying on a narrow bench while balancing the body from left to right;

10. Standing on one leg while holding a football or a stick for as long as possible with the other leg bent backwards.

5. Discussion and conclusions on the practical study

1. The results of the first test (Medical history) shows us that a large number of young people as well as their parents did not know of the existence of a deviation of the vertebral column, its cause or for how long it has been a problem.

2. Test 2 (diagnostic scoliosis and kyphosis) highlights the increased number of conditions to the spine of students in the third year, compared to the years I and II. This is due to a longer time of work

but also due to the lack of attention or information on the programs of exercises meant to prevent and combat these conditions.

3. Tests 3 and 4 (static and dynamic balance) indicate a better balance for the third year students compared to the I and II year. At the static balance, 9 students in the third year, of 20 tested carried out without difficulty (score 2). For the years I and II 7 students for each year have achieved the test without difficulty (score 2). At the dynamic balance all the third year students have carried out in a larger number (18) without difficulty (score 2) compared to the years I and II where there were 17 students each scoring 2.

4. We consider that there has been recorded a high number of students (9 of 60 students that have been tested) with serious problems of static balance (score 0). At the dynamic equilibrium only a student of 60 students failed to pass the test (score 0). This indicates that the vestibular system has to be strengthened. At this level it can be intervened with by effectively executing specific sets of exercises which we have presented.

5. The highest number of spine disorders were registered at III year students (11 cases out of 60) indicating the higher number of hours spend on professional practice in a position that was deficient. In this respect, we presented sets of physical-medical exercises specific to the detected conditions.

6. The students were very interested in this study and they had extracted the necessary information regarding the danger they expose themselves in their profession.

7. Our contribution to the study was to assess the working conditions of restorers and the consequences over the health statues to which they expose themselves. We also designed exercise physical – medical programs for each condition we detected during our tests and we printed brochures that were handed out to students.

8. The sets of physical- medical exercises presented in paragraph 5 of the paper were selected from the specialized literature by students at Kinetotherapy in order to be made available to all persons who will be detected with the above mentioned column conditions.

Aknowledgements

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