



FREE VIBRATIONS OF THE LEFT DELTOID OF THE HUMAN BODY USING ELECTROENCEPHALOGRAPHY

Dan Marius GHERASIM, Mariana ARGHIR

Abstract: The paper presents an experimental study of free vibrations performed by the left deltoid of the human body, which is removed from the equilibrium position and released. The material system assimilated to the left shoulder muscles of a human subject is subjected to a torsion vibration. Measurements are made on three human subjects, and the action of the targeted muscles is highlighted by electroencephalogram (EEG).

Key words: free vibrations, left deltoid system, EEG analysis, three human subjects.

1. INTRODUCTION

The human body, like any system on Earth, has three mechanical characteristics: mass, damper and arc [Arg 15]. These characteristics are applicable to the whole organism, but also to each component part of it.

If one studies the behavior of a single part of the human body, in this case - the left deltoid - it has the mechanical characteristics of mass, the behavior of depreciation and elasticity, in individual point of view, but also in correlation with the other organs and systems of the human body, with which it is connected, or with which it works.

2. PRESENTATION OF EXPERIMENT

In this paper is carried out the study in order to apply vibrations on the muscular system of the left shoulder [Ghe 20]. One of the three muscles of the system is strained by an operator, and he twists the muscle. After which, the muscle is left free, and executes free depreciated oscillations. The motion of the muscle will be analyzed with the help of the medical system [KL-720], using the electroencephalographic module.

2.1. The People Investigated

Three females, different from an occupational point of view, dimensional and age, and the

subjects were selected to carry out this vibrational study. They were informed of the conduct of the experiment and voluntarily agreed to participate in it.

They are named M_i , $i=1, 2, 3$. Their identification is given in the following list:

1. **M1** is a 45-year-old woman with a height of 1.60 m and a weight of 67 kg,
2. **M2** is a 74-year-old woman of the third age, with a height of 1.57 m, and a weight of 58 kg,
3. **M3** is a middle-aged woman, who is 51 years old, with a height of 1.67 and a weight of 66.5kg.

2.2. Biomedical System KL – 720

The **KL-720** biomedical system is created by the company K&H MFG CO., LTD Taiwan [KL-720]. It is created for university studies in the field of the action of vibrations on the human body and contains nine modules to investigate.

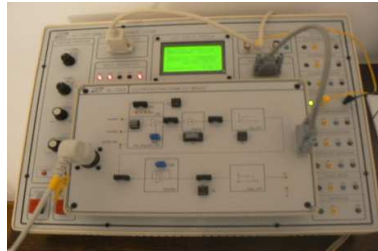


Fig. 1. The motherboard of the biomedical system, together with the electroencephalogram module

One of these modules (Fig. 1) is for the determination of the electroencephalogram, which is used in this experimental study.

2.2.1. Positioning of electrodes for electroencephalogram

The recording of muscle activity in the left deltoid is carried out by the module of the biomedical system, if the movement performed by the muscles is captured by the electrodes, which are positioned on the body, as in Figure 2, to perform the electroencephalogram.

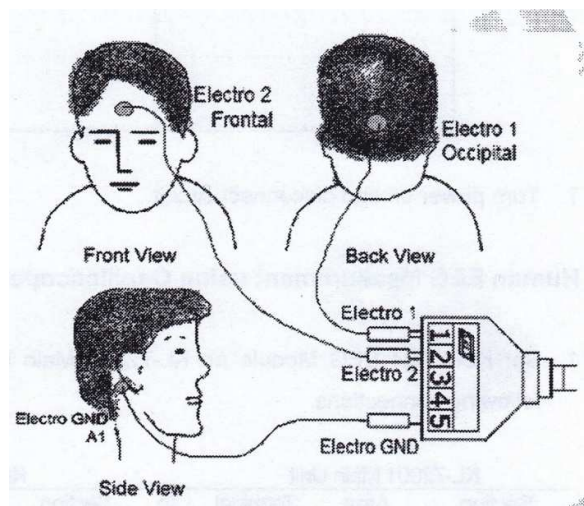


Fig. 2. Position of the Electrodes for Electroencephalogram

2.3. Human System Investigated

The human system investigated is the left deltoid, which consists of three distinguished muscles, which work together, and which are named as follows [Pap XI]:

- The posterior deltoid located at the back,
- The middle deltoid, the big one of them, which carries out its motor activity of the arm,
- The anterior deltoid, located in front and is the smallest in the group, as shown in Figure 3.
- The deltoid is located on the surface and is the most voluminous of the um shoulder muscles. It is a multipennate muscle, has a triangular form and covers the joint scapulo-humeral (Fig. 3).

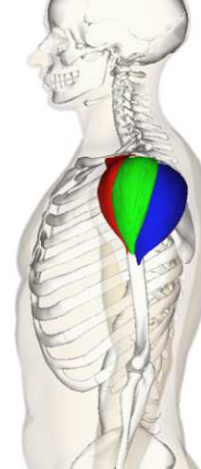


Fig. 3. Anterior deltoid (red), medium (green) and posterior (blue) [Ghe 21a]

The scapula-humeral joint has the greatest mobility of all the joints of the body and is also the most unstable. The six shoulder muscles are: deltoid, supraspinous, infraspinous, large round, small round and subscapular [Osc 03a], [Osc 03b].

2.4. Muscle Therapy

To highlight the action of vibrations on the human body and to establish their energetic influence, the Bowen technique will be applied.

The request for the left deltoid is made in a sequence of three stages, which is shown in figures 4, 5, and 6, as follows:

- Figure 4 – the posterior deltoid is caught by the officiant and moves by turning and tossing over the median deltoid [Ghe 20].



Fig. 4. Deltoid Oblique Displacement

- Figure 5 – contains turning the arm towards the front, until it makes a right angle in front of the one being investigated. In the final position, a slight blow is applied to the shoulder.



Fig. 5. The Second Motion [Ghe 20]

✚ Figure 6 – is for the last motion, which means bringing the left arm to its original resting position.



Fig. 6. The Third Motion [Ghe 20]

3. EXPERIMENTAL ACTION

The therapist applied the Bowen procedure to every human subject involved in the study. Electroencephalographic recordings were made before, during and after the application of the procedure, in a sequence, which is also specified the changes made to the recording system, which can be seen on the screen. The sequence is:

1. Before one minute of application of the procedure, with the indicators set at 0.7 and 350,
2. Before the procedure with indicators 2.5 and 350,
3. Maneuver 1 with the right hand – for calibration,
4. Maneuver 1 with left hand – for treatment,
5. Break 1 between moves,
6. During the procedure with the right hand,
7. During the procedure with the left hand,
8. Break 2 between moves,
9. Maneuver 2 with the right hand,
10. Maneuver 2 with left hand,

11. Registration one minute after the Bowen procedure was applied.

3.1. Therapy Applied to M1

The sub called M1 is shown in the sequence of figures 7 with the images, which contain for fixing the electrodes. Figures 8 – 18 contain the electrocardiogram records in the sequence specified in paragraph 3 of this paper.



Fig. 7. M1 with the Electrodes

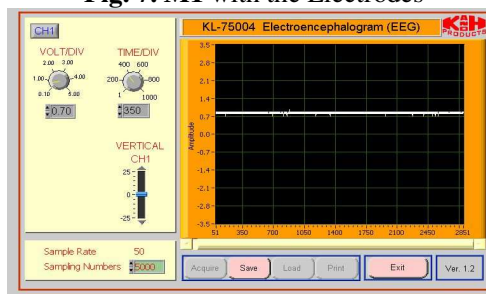


Fig. 8. M1 – registering before with the indicators set at 0.7 and 350

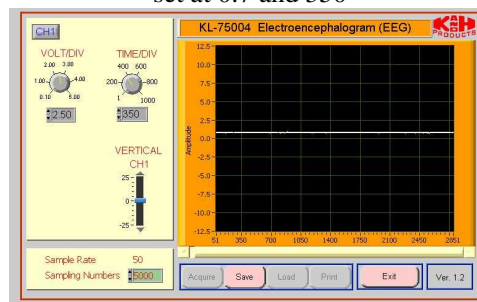


Fig. 9. M1 - Before the procedure with indicators 2.5 and 350

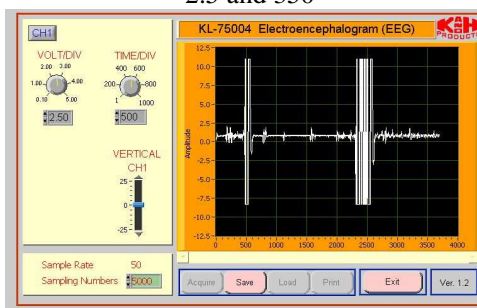


Fig. 10. M1 - Maneuver 1 with the right hand

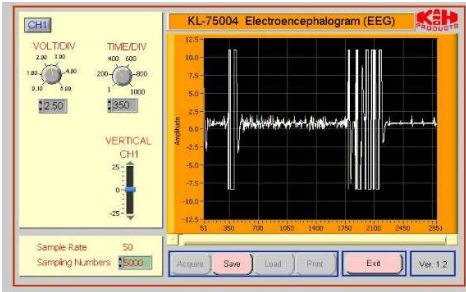


Fig. 11. M1 - Maneuver 1 with left hand

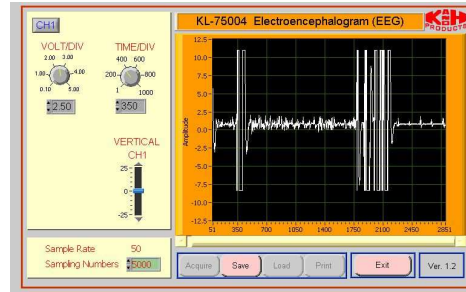


Fig. 16. M1 - Maneuver 3 with the right hand

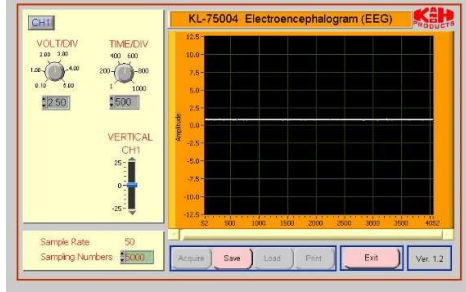


Fig. 12. M1 - Break 1 between moves

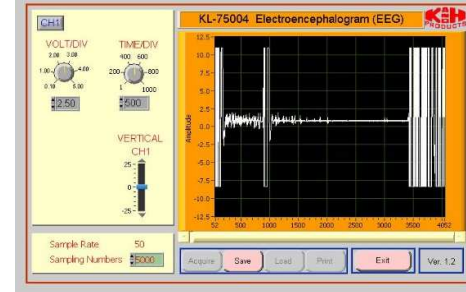


Fig. 17. - Maneuver 3 with the left hand

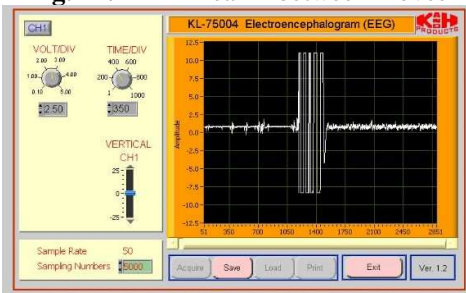


Fig. 13. M1 - During the procedure with the right hand (motion no. 2)

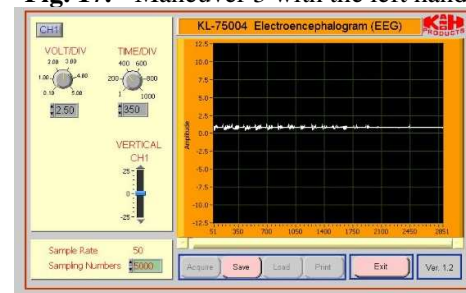


Fig. 18. M1 - Registration one minute after the Bowen procedure was applied.

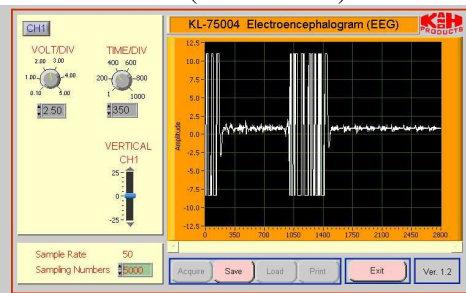


Fig. 14. M1 - During the procedure with the left hand (motion no. 2)

3.1.1. Discussion of M1

M1 is a medically healthy woman, does not cause pain in her left shoulder, and during the investigation was rested, because she previously slept for about an hour.

3.2. Therapy Applied to M2

The subt called M2 is shown in the sequence of figures 19 with the images, which contain for fixing the electrodes. Figures 20 – 29 contain the electrocardiogram records in the sequence specified in paragraph 3 of this paper, without first image.

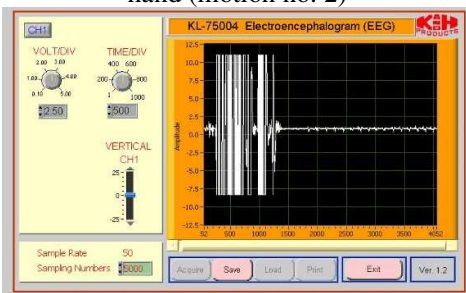


Fig. 15. M1 - Break 2 between moves



Fig. 19. M2 – Electrodes Fixed on the Person

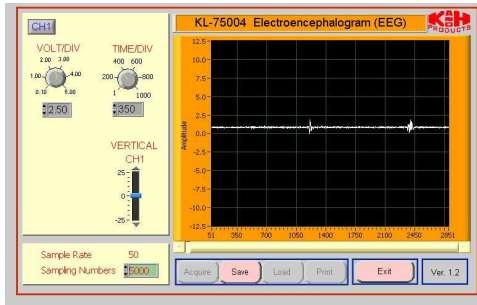


Fig. 20. M2 – Before of Bowen Procedure

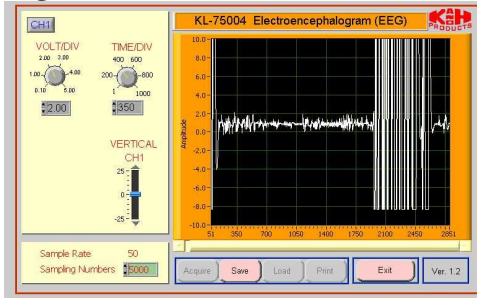


Fig. 21. M2 - Maneuver 1 with the right hand

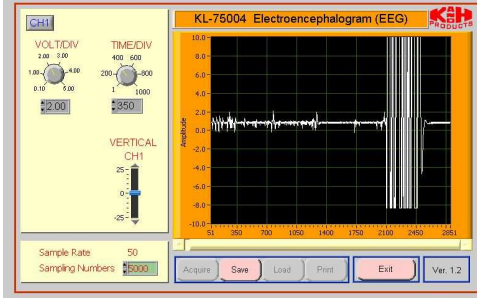


Fig. 22. M2 - Maneuver 1 with the left hand

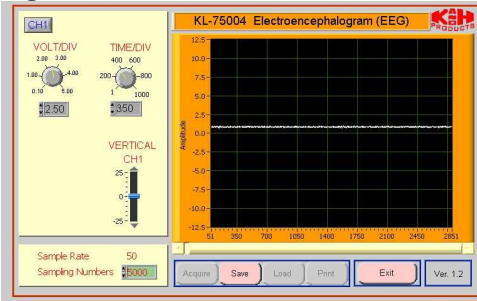


Fig. 23. M2 - Break 1 between moves

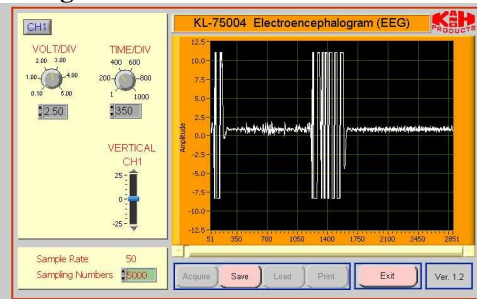


Fig. 24. M2 - During the procedure with the right hand (motion no. 2)

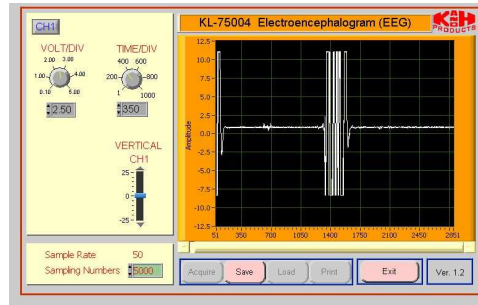


Fig. 25. M2 - During the procedure with the left hand (motion no. 2)

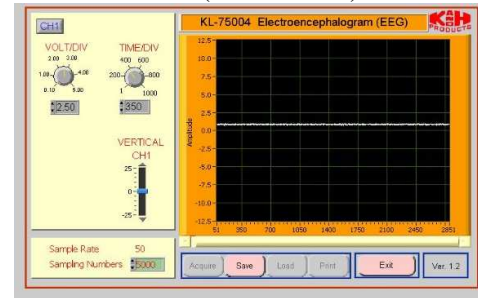


Fig. 26. M2 - Break 2 between moves

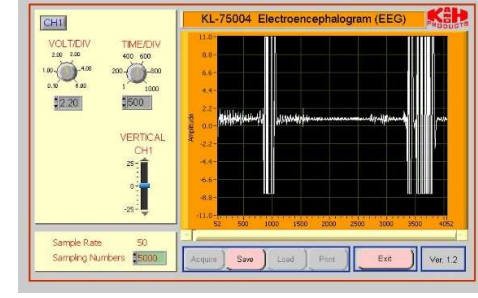


Fig. 27. M2 - Maneuver 3 with the right hand

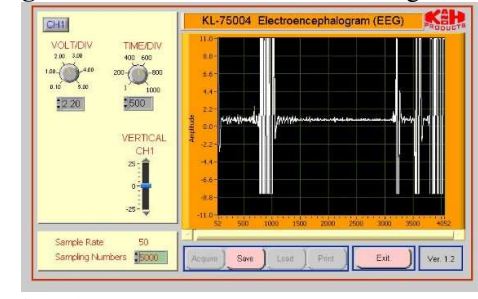


Fig. 28. M2 - Maneuver 3 with the left hand

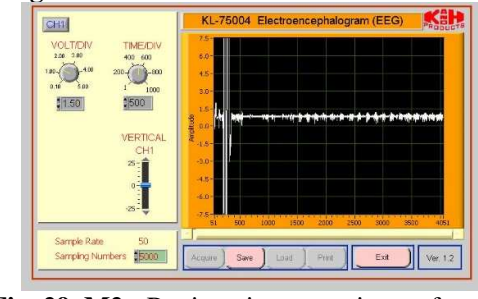


Fig. 29. M2 - Registration one minute after the Bowen procedure was applied.

3.2.1. Discussion about M2

The person being investigated, called M2, is an elderly woman, who is suffering pain in her left shoulder, of a long time and for whom the application of the Bowen procedure, requesting the left deltoid was necessary.

Free vibrations induced in the left deltoid made possible the recovery of the central nervous system, which from the recorded electrocardiograms can lead to some interpretations of the reaction of the left deltoid muscle of the investigated person.

The subject responds positively to the request of the deltoid muscle, the proof of the oscilloscopes 21, 24, 27 for the right hand, as well as the oscilloscopes 22, 25 and 28 for the left hand. The first ones for the right hand have values higher than those for the left hand, from which it follows that the absorption of energy in the left shoulder is superior to that of the right shoulder and in this way the suffering disappears.

Important observation: This investigated person (M2), recognized the reduction of pain following the application of the Bowen procedure and the investigations carried out.

3.3. Therapy Applied to M3

The sub called M3 is shown in the sequence of figures 30 with the images, which contain for fixing the electrodes. Figures 31 – 40 contain the electrocardiogram records in the sequence specified in paragraph 3 of this paper.



Fig. 30. M3 – Position of Electrodes

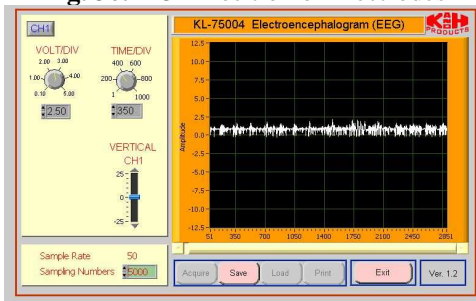


Fig. 31. M3 – Before Bowen Procedure

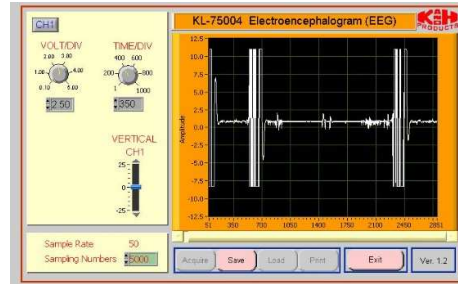


Fig. 32. M3 - Maneuver 1 with the right hand

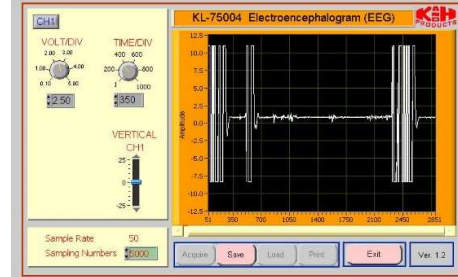


Fig. 33. M3 - Maneuver 1 with the left hand

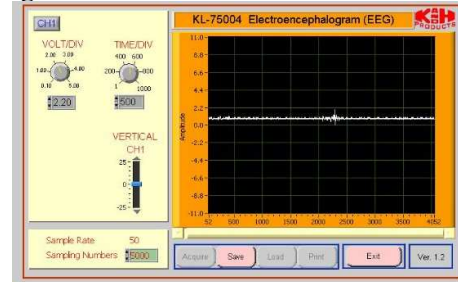


Fig. 34. M3 - Break 1 between moves

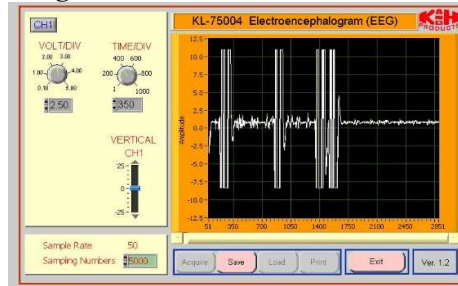


Fig. 35. M3 - During the procedure with the right hand (motion no. 2)

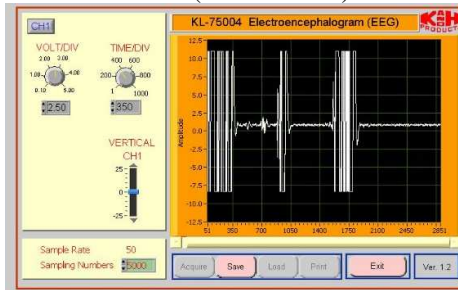


Fig. 36. M3 - During the procedure with the left hand (motion no. 2)

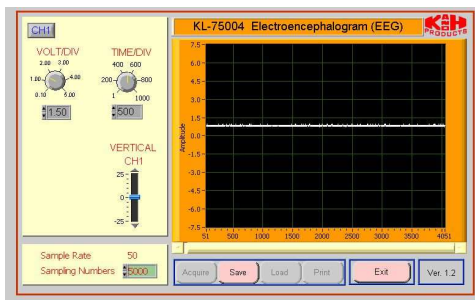


Fig. 37. M3 - Break 2 between moves

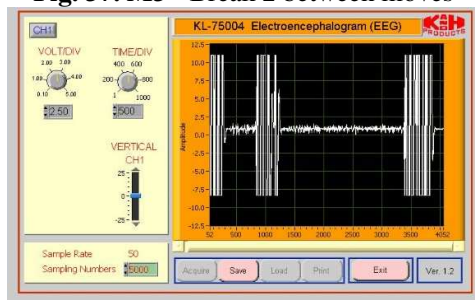


Fig. 38. M3 - Maneuver 2 with the right hand

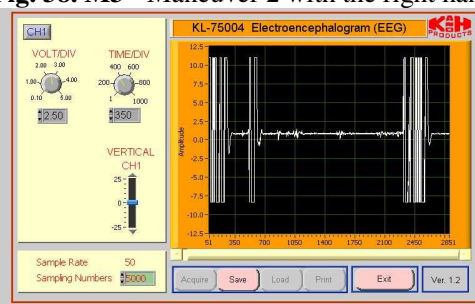


Fig. 39. M3 - Maneuver 2 with the left hand

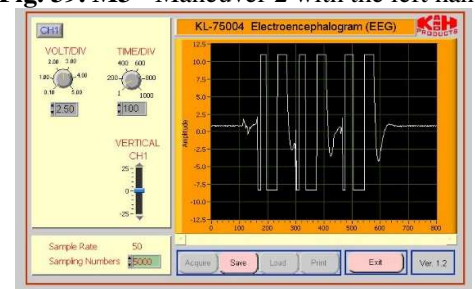


Fig. 40. M3 – Individual Maneuver after Bowen Procedure with 100 per Division

3.3.1. Discussion about M3 Person Subjected to Bowen Therapy for Left Deltoid

Person investigated, denoted with M3, is a woman of middle age, with dimensions and proportional weight. This causes severe pain in the left shoulder, which has been strong for a long time.

The application of the Bowen procedure made it possible to induce free vibrations in its left shoulder. Thus, it was possible to carry out investigations with the KL-720 Biomedical System.

From the analysis of the oscillograms presented in the figures related to the person M3, the following aspects can be listed:

- The person considered has an acute suffering, which can only be remedied by many sessions of the proper procedure of suffering.
- Investigation by highlighting the EEC, shows the energy absorption of the muscles of the left deltoid, at all stages of the application of the procedure.

4. CONCLUSIONS

The work constitutes a study on the muscular system with a focus on the left shoulder muscle, which make free vibrations used in the Bowen technique will be applied.

The paper proves that the application of the investigation of free vibrations by highlighting the electroencephalograms of the various phases of the movement of the left arm, is an experimental practice beneficial to the investigation.

From the analysis of the electroencephalograms of the three subjects investigated, it can be said that:

1. **M1** is healthy and is considered the benchmark for the other two persons investigated. The claim results from the fact that the oscillograms have comparable amplitudes in the three movements performed, as well as during the breaks between movements. No noticeable changes are made before, during, or after the procedure.
2. **M2** is an elderly, suffering person who experiences chronic pain in the left shoulder. The application of the procedure is beneficial, and this results from the fact that the applications of the oscillations decrease from one movement of the arms to another, so the energy is absorbed over time. This

person is susceptible to healing, which has been proven in his verbal statement.

3. **M3** is a middle-aged woman. This causes acute chronic pain in many parts of the body, including the left shoulder. This required long-term pre-training to apply the Bowen procedure on the left shoulder. The electroencephalographic investigation proved beneficial, because it highlighted the fact that all the energy of the movements was absorbed by the muscles of the left deltoid. At the end of the procedure the shoulder had very small oscillations, which in order to be highlighted had to change the scale of the recording.

The present work proves that the free vibrations of the muscles can be highlighted by electroencephalographic recordings. They manage to differentiate that the energetic absorption of the muscles depends on the state of health of the subject under investigation.

6. REFERENCES

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VIBRATIILE LIBERE ALE DELTOIDULUI STANG AL CORPULUI UMAN FOLOSIND ELECTROENCEFALOGRAFIA

Rezumat: Lucrarea prezinta un studiu experimental al vibratiilor libere efectuate de deltoidul stang al corpului uman, care este scos din pozitia de echilibru si este eliberat. Sistemul material asimilat muschilor umarului stang al unui subiect uman este supus unei vibratii de torsiune. Se efectueaza masuratori pe trei subiecti umani, iar actiunea muschilor vizati este pusa in evidenta prin electroencefalograma (EEG).

Dan Marius GHERASIM, PhD Student, Technical University of Cluj-Napoca, Department of Mathematics, str. L. Baritiu, nr. 27, Tel: 0747.408.381, E-mail: dangherasim@yahoo.com, ROMANIA

Mariana ARGHIR, Em. Prof. Dr., Technical University of Cluj-Napoca, Department of Mechanical Engineering Systems, B-dul Muncii, No. 103-105, Tel: 0729.108.327, E-mail: marianaarghir@yahoo.com, Marghir@mep.utcluj.ro, ROMANIA