Management of the patients' data recorded by electro-medical apparatus

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***Abstract*-**In this paper it is presented the activity for recording the patients' data using electro-medical apparatus. These recording are made in different environmental conditions to analyze the influences of the ambient temperature and the quality of air on the stability and waking behavior and on the level capacity effort. The results are presented in the final part of the paper.

I. Introduction

"Health as defined in the World Health Organization's constitution is "*a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity*." The state of health of an individual or population depends upon complex interactions of the physical, biological, political, and social domains. Over the past century, human activities and behavior have played a major role in global environmental change, with increases in atmospheric greenhouse gases, depletion of the stratospheric ozone layer, loss of biodiversity, pollution of water resources, and degradation of soils. In turn, these and other global environmental changes are beginning to affect the health and welfare of human populations.

According to the United Nations Environment Programme (1992) in *Saving Our Planet*, "All constituents of the environment of our planet ultimately exert an influence on human health and well-being." Only recently have scientists begun to explore these influences, and most of the literature currently available focuses on the effects of climate change". [5]

The European Commission adopted in **2003 an EU Strategy on Environment and Health**, with the overall aim to reduce diseases caused by environmental factors in Europe.

This was followed up by the **European Environment and Health Action Plan 2004-2010** which proposes an **Integrated Information System on Environment and Health** as well as an coordinated approach to **Human Biomonitoring** between Member States to render the assessment of the environmental impact on human health more efficient.[6]

Each and every day your body encounters a complex array of physical, chemical and biological environmental stressors. They range from chemical pollutants and particulate matter in the air to electromagnetic radiation and the food we eat.

We are never subject to single stressors at set doses, but a complex mix over a long period of time.

The health effects of such may be very different to the effects of any single agent so it is important to develop models to assess the cumulative effects of mixtures of different factors and stimulus.

We are complex organisms living in a complex environment, so just how the environment influences an individual's health is hard to determine.

Different factors affect individuals in different ways and we can only understand the interactions of environmental factors and our health in terms of risk.

Different mechanical or environmental factors affect a body's stability or walking behavior; also different factors, like light, sound, temperature, vibrations or noises affect the entire human body's stability and walking, but the most important aspect is to understand and to establish correctly the level of the human effort capacity necessary in to have a good health and life.

An important factor affecting human body stability and direction of walking is the support base size; the forces and moments developed in the contact between legs and background are necessary to be analysed specially in the moment of external factors action.

All these informations can be collected and analysed to establish the methodologies for evaluate the impact of the environmental factors on the human behaviour.

A. Experimental setup

The experimental setup proposed by this paper it is presented in the fig.1.

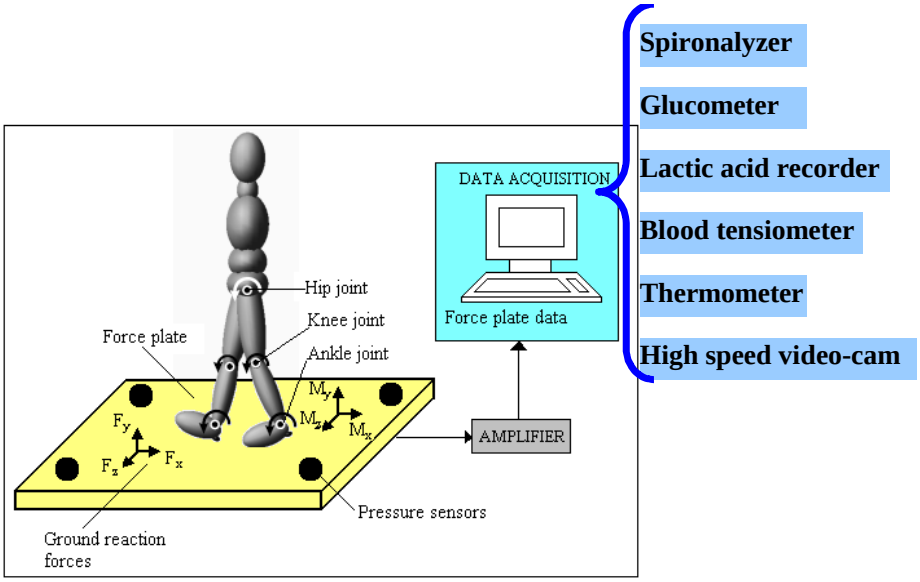

Fig.1. Experimental setup to record the stability and walking parameters of the human body using a Kistler force plate and electro-medical apparatus

To record the stability and walking of the human body we use a Kistler force plate with 4 (four) piezoelectric sensors to measure the forces and the moments from 3 (three) directions. This force plate is equipped with an amplifier with 12 channels and we can use also 2 (two) similar force plates in the same amplifier. The specialized software for recording and manage the data it is also available. For that a very good and performing computer it is necessary to be used because there are many and bigger recordings of the response signals from acquisition system and also from high-speed video-cam and electro-medical apparatus.

B. Methodology of data acquisition

Because it is very important to know and keep the environment recording conditions in the same limits and values for each investigations we're recording all parameters for the same person in the same day. In the first step of investigation we're recording the physiological information's about weight, high, blood pressure and pulse, oxygen quantity in the blood, lactic acid and quantity of glucose and temperature (fig.2.)

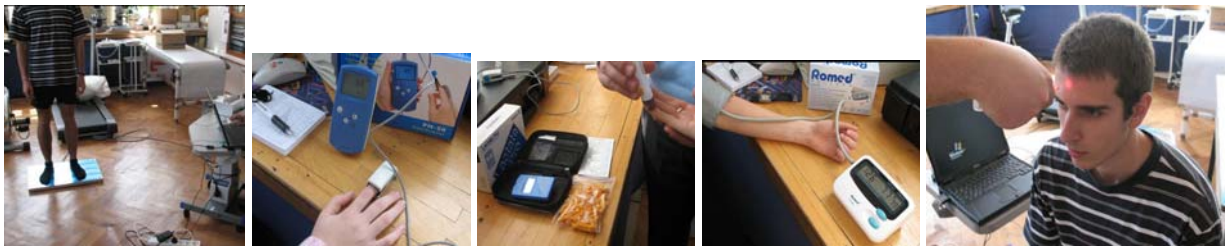

Fig.2. The recording of the subjects' physiological information's

The person participated to this investigation was recording in three daily time (morning, afternoon and evening) to have all kind of information's about the variations of these parameters in the day time or about the variation of values for human body weight. It was very important to know and to record the special situations for the person who came from outside, in different moments of the day (morning, afternoon or evening). For that we're simulating in the laboratory such conditions using an ergometer bicycle and running belt to obtain the information's about the quantity of effort develop by this person and the influence of the urban environment.
For recording the stability of the human body it was necessary, also to establish the size of contact base and the sort of external stimulus (open and close eyes, source of sound).

Fig.3.The subjects' postural behaviour recording (close eyes), in two different moment of the day

In other two initial conditions (with big and with small contact base) the recording are made in two stimulating situations: with eyes open and with eyes close and also we want to know how the stability of human body will change if the arms are near body or they are in lateral or in front of human body.

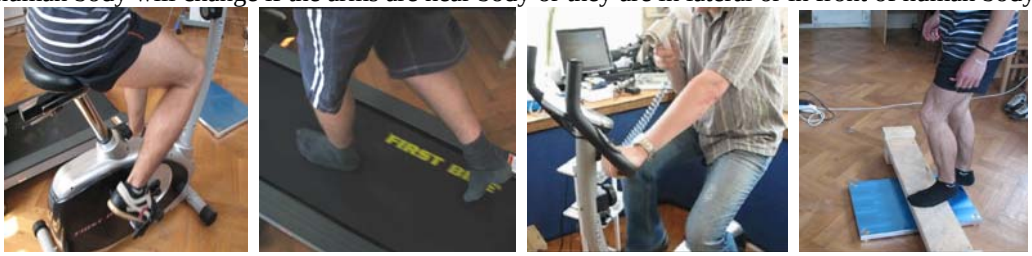

Fig.4. The recording of the subjects' behaviour in the effort simulation time

C. Results

In the following graphs we present the recordings made with the same subject, in the same conditions (position of hands, day time-morning after a relaxed period, the same environment physical conditions etc.) but in different situations, simulating the influence of the biomechanical effort in the human body.

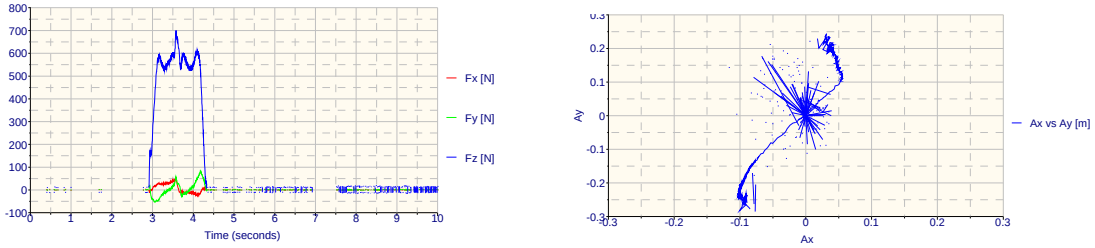

Fig.5.The forces (x, y ,z) diagram and the trajectory of walking in initial conditions (before effort)

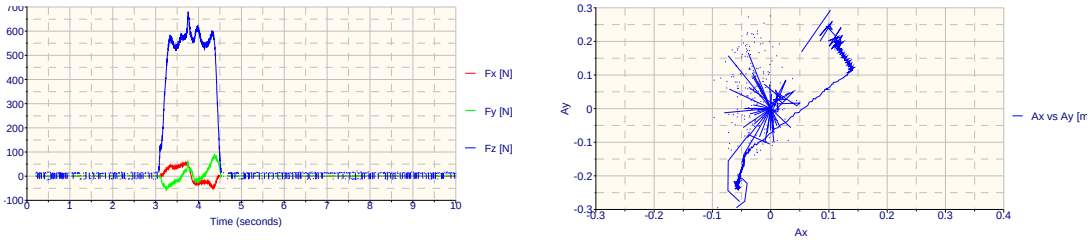

Fig.6.The forces (x, y ,z) diagram and the trajectory of walking in same conditions (after effort)

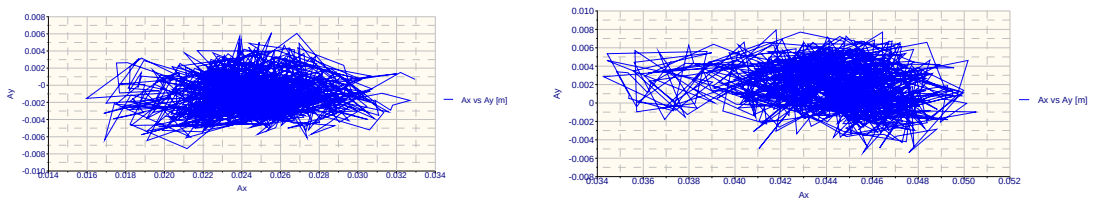

Fig.7.The stability diagram in same conditions-open eyes (before and after effort)

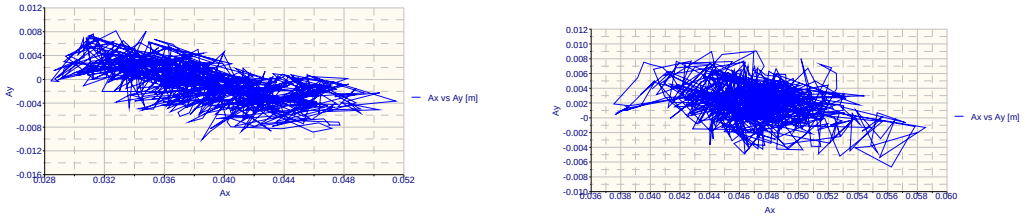

Fig.8.The stability diagram in same conditions-close eyes (before and after effort)

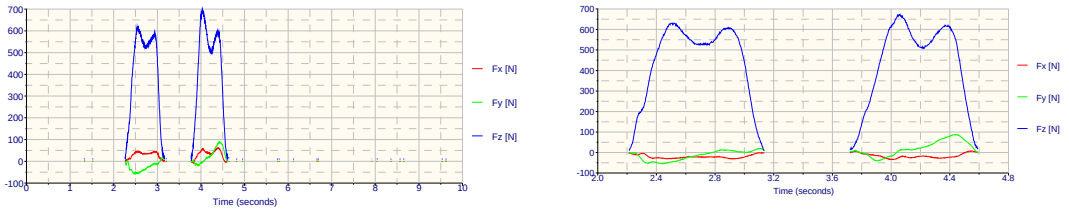

Fig.9.The stepping moving diagram in different conditions-right and left leg (before effort)

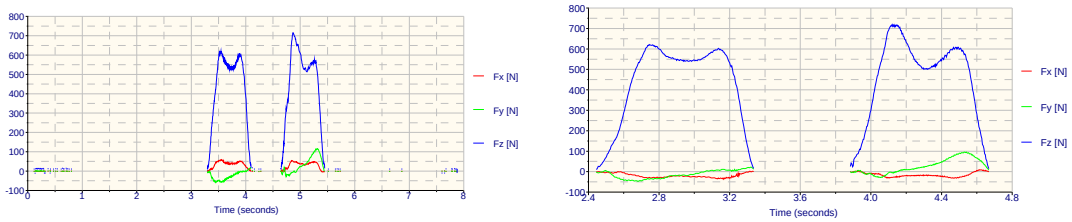

Fig.10.The stepping moving diagram in different conditions-right and left leg (after effort)

Analyzing the diagrams presented in fig.5-10 we see that the trajectory of walking test, before and after effort, had a very important modification in surface limits and the pressing force level on *z* axis present a significant growth in situation after effort. This situation is a very important conclusion for study the people walking on the street in different air pollution and variation of temperature.The analyze of the stability diagram – before and after effort – shows a similar behavior of the human body even he has open eyes during the tests.

II. Conclusions

From these recordings and in according with the initial conditions and the demands of the researches we can conclude:

- changes in foot position have been found to affect measurements of standing balance and stability;
- under normal conditions the variation of environment temperature was the most important factor which affects the stability and the walking actions. The person has a lower temperature immediately after the effort and it growths with the time;
- changing the state of human body (relaxed or after effort) it can observe that the stability areas are different like shape, but almost the same like values;
- the influence of the principal foot in stepping action (right or left) are also the most important because the instability will be bigger in the situation before effort and it is decreased after effort because the human body wants to protect him and uses minimum force to make a step. This situation is due of the quantity of lactic acid existing in the legs muscles and measured during the tests.

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