Bulletin of the *Transilvania* University of Braşov • Vol. 3 (52) - 2010 Series VI: Medical Sciences

STRESS, PRACTICAL APPLICATION ON A POPULATION GROUP

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Abstract: *Health status of a population can be evaluated only through biostatistical methods. This study begins with a brief report about stress and further evaluates the association between stress, as risk factor, and different diseases. A group of employees was tested for exposure to three levels of stress: very high, medium and low, but we also took into account other risk factors such as: smoking, overweight, alcohol addiction. The data were analyzed using descriptive bio statistical methods. The study revealed the aspects regarding stress as risk factor for certain diseases.*

Key words: *Health Status, Stress, Biostatistical Analysis.*

1. Introduction

Stress is an adaptation syndrome that the individual develops it as a result of environmental aggression, assembly that includes: tenseness, tension, coercion, force, demand.

In 1956 Hans Selye emphasized that "stress is a nonspecific physiological response of the body to any threatening demand" [1].

Stress is difficult for scientists to define because it is a subjective sensation associated with varied symptoms that differ for each of us. In addition, stress is not always a synonym for distress. Situations like a steep roller coaster ride that cause fear and anxiety for some can prove highly pleasurable for others. Winning a race or election may be more stressful than losing but this is good stress.

Increased stress increases productivity – up to a point, after which things rapidly deteriorate, and that level also differs for each of us. It's much like the stress or tension on a violin string. Not enough produces a dull raspy sound and too much an irritating screech or snaps the string – but just the correct degree of stress creates a beautiful tone. Similarly, we all have to find the right amount of stress that permits us to make pleasant music in our daily lives [6]. We can learn how to utilize and transform stress so that it will make us more productive and less self-destructive.

Many different things can cause stress - from physical (such as fear of something dangerous) to emotional (such as worry over your family or job). Some of the most common sources of stress are:

Survival Stress -"fight or flight". This is a common response to danger in all people and animals. When you are afraid that someone or something may physically hurt you, your body naturally responds with a burst of energy so that you will be better able to survive the dangerous situation (fight) or escape it all together (flight) [5]. This is survival stress.

Internal Stress – This appears when

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you worry about things you can do nothing about or worry for no reason at all? This is internal stress and it is one of the most important kinds of stress to understand and manage. Internal stress is when people make themselves stressed. This often happens when we worry about things we can't control or put ourselves in situations we know will cause us stress. Some people become addicted to the kind of hurried, tense, lifestyle that results from being under stress. They even look for stressful situations and feel stress about things that aren't stressful.

Environmental Stress - This is a response to things around you that cause stress, such as noise, crowding, and pressure from work or family.

Fatigue and Overwork - This kind of stress builds up over a long time and can take a hard toll on your body. It can be caused by working too much or too hard at your job(s), school or home. It can also be caused by not knowing how to manage your time well or how to take time out for rest and relaxation [5]. This can be one of the hardest kinds of stress to avoid because many people feel this is out of their control.

The state of stress has three stages:

- alarm,
- resistance,
- exhaustion.

The response to stress factors is mediated by corticotrophin-releasing hormone (CRH), hypothalamic - pituitary - adrenal axis and sympathetic nervous system (SNS).

The adaptive response is dependent on age, gender, hormonal status and other genetic factors.

Corticotrophin-releasing hormone controls the state of wakefulness, the physical state and integrates the systems response to stress. It also activates the hypothalamic - pituitary - adrenal axis that stimulates the production of ACTH and corticosteroids and the sympathetic nervous system that stimulates the synthesis of epinephrine and norepinephrine.

CRH is the trigger of the alarm condition, evidenced by:

- increase blood glucose,
- increase heart rate,
- increase blood pressure,
- inhibition of immune function,
- inhibition of inflammatory response [4].

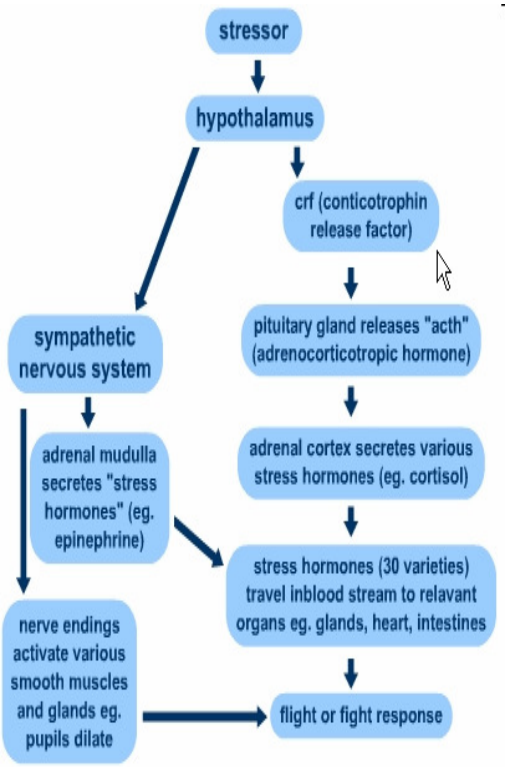

Fig. 1. *Stress effects*

Excess stress can manifest itself in a variety of emotional, behavioral, and even physical symptoms and the symptoms of stress vary enormously among different

individuals [7]. Common somatic (physical) symptoms often reported by those experiencing excess stress include sleep disturbances, muscle tension, headache, gastrointestinal disturbances and fatigue. Emotional and behavioral symptoms that can accompany excess stress include nervousness, anxiety, changes in eating habits including overeating, loss of enthusiasm or energy and mood changes [8]. Of course, none of these signs or symptoms means for certain that there is an elevated stress level since all of these symptoms can be caused by other medical and/or psychological conditions.

It is also known that people under stress have a greater tendency to engage in unhealthy behaviors, such as excessive use or abuse of alcohol and drugs, cigarette smoking, and making poor nutritional choices, than their less-stressed counterparts [3]. These unhealthy behaviors can further increase the severity of symptoms related to stress, often leading to a "vicious cycle" of symptoms and unhealthy behaviors.

2. Materials and methods

In year 2008, a group of 1405 employees was tested for exposure to three levels of stress: very high, medium and low. Besides stress we took into account other risk factors such as: smoking, overweight, alcohol addiction. The data were analyzed using descriptive bio statistical methods.

We calculated: indicators for central dispersion tendency for quantitative characteristics, proportions for qualitative characteristics and statistical meaning differences in chi square test distributions.

3. Results

Total subjects at the end of 2001: 1405. By gender distribution 1252 are males (89.4%) and 153 are females.

According to age groups distribution:

- up to 35 years : 772, meaning 55.1%;
- 36-45 y.: 558, meaning 39.8%;
- 46-55 y.: 67, meaning 4.6%;
- more than 55 y: 8, meaning 0.5%.

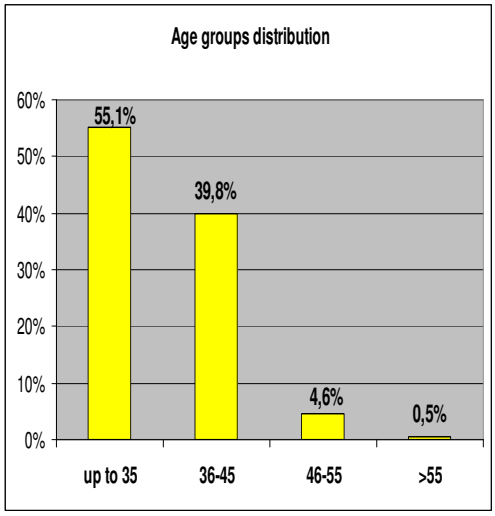

Fig. 2. *Age group distribution*

As written above, age groups up to 35 and 36 to 45 years represent 94.9% of the employees.

By distribution according to education level: 303, meaning 21.5% have University degree, 974, meaning 69.6% graduated college, 13, meaning 0.8% have medium education and 113, meaning 8.1% are administrative personnel.

During 2008, medical center had within this institution 84 patients with chronic diseases registered, meaning 6%.

Most of the patients were aged between 40 – 44 years- 24.4%, followed by age group 50-54 – 23.1% and 45-49 representing 19.2%. This means that over 70% of the registered patients are aged between 40-54 years.

Average patients' age is 43.01 years +/- 8.22 years with a coefficient of variation of 19.1%. Since age dispersion against the average is wide, we considered that medium age, that is 44 years, would better

characterize the distribution.

Fig. 3. *Distribution by age group of patients with chronic diseases*

Graph 4 represents distribution of risk factor stress and we can see that the stress has the biggest impact in their lives and the fewest of them are alcohol addicted.

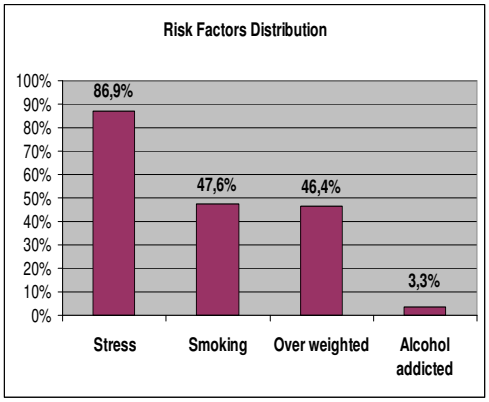

Fig. 4. *Distribution of risk factors*

Stress: 73 of 84 patients represent subjects exposed to stress, meaning 86.9%,

smoking: 40 are smokers, meaning 47.6%.

Over weighted: 39, meaning 46.4% and alcohol addicted: 28, meaning 3.3%.

Stress represents the risk factor with the higher exposure and, according to stress intensity we can conclude:

- 57.1%, meaning 44 are exposed to very high stress;
- 37.7% are exposed to medium intensity stress;
- 3 of the patient are exposed to low intensity stress;
- One patient has no exposure to stress.

According to age groups stress has the following distribution:

- age group 50-54- 11 patients, all managerial staff, is exposed to a high intensity stress;
- age group 40-44 – 10 patients (34.5%): exposed to medium intensity stress.

There are statistical significant differences in stress factor distribution among age groups: $\chi 2 = 74.34$ (<0.05) [2].

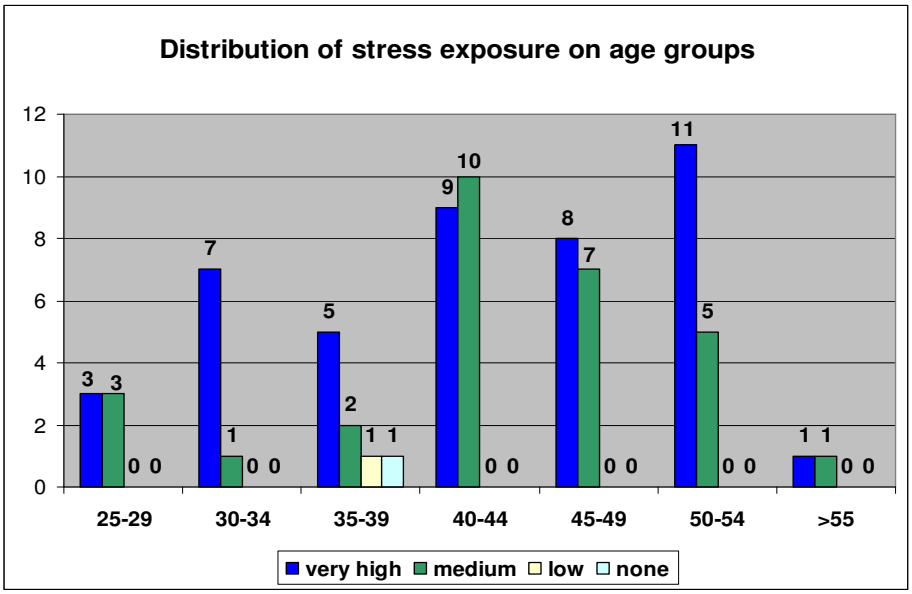

Fig. 5. *Distribution of stress exposure on age groups*

4. Conclusions

This study revealed the following aspects regarding stress as risk factor for certain diseases:

- 86.9% of the registered 84 chronic patients were exposed to stress;
- Of the 84 chronic patients, most were exposed to high and medium intensity stress:
  - the most intense stress was perceived by age group 50-54, managerial staff, exposed to very high stress (25% of this age group);
  - the second comes age group 40-44, exposed to high stress (20.5%);
  - age group 40-44 meaning 34.5%, was exposed to a medium intensity stress;
- Age group stress distribution is statistically significant by applying chi square test of 74.34 ($p< 0.05$);

Diseases having stress as the most important risk factor are: duodenal ulcer, hypertension and ischemic heart disease

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