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6 - RELATIONSHIP BETWEEN STRESS, CANCER AND IMMUNE SYSTEM

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Abstract

Nowadays, stress has become an important concept in modern society which has led to its understanding and especially the negative effects it has on health. In our time the structures subject to most stress are not the muscles, bones or internal organs, not anymore; the emotional area, namely the mind and the soul are now subject to it. The disease of the 21st century is the stress generated by the impact which the excessively large amount of information to be processed in a very short time has upon mankind. Prolonged exposure to stress can adversely affect the health, accompanying most often during cancer disease, favouring anxiety (Burgess et al., 2005), depression (Spiegel & Giese-Davis, 2003), the occurrence of stroke or myocardial infarction (Neelakantan, 2013). Most common mental disorders in neoplastic diseases are depression and anxiety, which may occur at different times during the course of the disease: when the diagnosis has been communicated, during treatment, at the time of relapse, etc. Quality of life of a cancer patient also decreases due to the negative impact of the disease on the immune system, especially in cancer progression and spread through the body (Andersen et al., 1994).

Cuvinte cheie: cancer, stres, imunitate, tulburări psihice, recidive, calitatea vieții

Keywords: cancer, stress, immunity, mental disorders, relapse, quality of life

1. AN APPROACH TO CANCER – THEORETICAL FRAMEWORK REGARDING CANCER EVOLUTION

1.1. WHAT IS CANCER?

Cancer affects cells, the fundamental unit of body alive. “Cancer is a disease entity characterised by uncontrolled cell proliferation” (Cooper, 1992, p. 4). Grouped under the name of cancer are very different diseases that have some important things in common. In order to understand cancer, it is useful to know how normal cells become cancerous.

The body is made up of many cell types. Normally, cells grow, divide and produce more cells to maintain a healthy body and its proper functioning. However, sometimes the process goes astray – cells keep dividing when there is no need for new cells, excess cell mass forming into tumour growth.

Cancer is made up of epithelial cells, fibroblasts, innate and adaptive immune cells, specialised mesenchymal cells, etc. (De Visser et al., 2006).

Tumours can be benign or malignant. Benign tumours have a slow growth rate; there is not a serious risk of a rapid proliferation, seeping tissues nearby do not spread throughout the body through the blood or lymph (Crowley, 2004, p. 208). Often they can be surgically removed and in most cases they do not return.

Malignant tumours are the forms of cancer that divide anachronic, proliferating rapidly, thus invading the surrounding tissues. Cells in malignant tumours are abnormal and they divide without control or order, surpassing cell division in a healthy body. These cancer cells can invade and destroy the tissue around them (Vasile, 2014).

By Kessenbrock, Plaks and Werb (2010), Talmadge and Fidler (2010) cited by Elk and Landrine (2012, p.3) cancer is a group of diseases in which cells have the ability to invade surrounding tissue and present a potential risk of metastasis in other distant areas of the body.

In the literature, the authors identified several types of cancer, classifying tumours based on the concept of histogenesis or “cell of origin” (De Schepper et al., 2006, p. 223). By Goodman and Snyder (2013, p. 494) it can differentiate the following types of cancer: carcinoma, sarcoma, lymphoma and leukaemia.

2. WHAT IS STRESS?

After Sillamy (1998, p. 301) the word stress “was used for the first time by H. Selye in 1936 to describe the condition in which there is a body threatened by imbalance under the threat of agents or conditions that endanger its homeostatic mechanisms”.

Selye (1950) cited by Iamandescu (1993, p. 5) defines stress as “a syndrome, a constellation of non-specific replies with a non-specific, adaptive general character.”

According to Popescu-Neveanu (1978, p. 686) “in the case of human emotions psychological stress is caused by prolonged emotions due primarily to frustrations, conflicts, anxiety.”

Elliot and Eisdorfer (1982) cited by Segerstrom and Miller (2004) classified stressor agents into five categories: acute time-limited stressors (public speaking or mental arithmetic), brief naturalistic stressors (academic examinations), stressful event sequences (the loss of a spouse or a major natural disaster), chronic stressors, and distant stressors. But because the stressor agents and reactions to stress vary from one individual to another, Lazarus et al. (1952) believe that we have to observe the individual differences in motivational and cognitive variables.

2.1. STRESS AND HEALTH STATUS

In 1976, referring to the different types of response to stress, Selye introduces the concepts of eustress (positive stress) and distress (negative stress); particularly in treating negative stress (Kupriyanov & Zhdanov, 2014). A defining feature of stressor agents that cause mental stress is that they do not trigger exactly the same reaction for every individual, but are merely potential to cause mental stress. It all depends on how potentially stressful the event is perceived by each individual. Stress evaluation is influenced by space and time (Parrillo, 2008), and that is why sometimes a particular stressor agent can cause an individual's mental stress, and other times not, because individuals may give different meanings, depending on the moment.

On the other hand, Rășcanu (2000, p. 293) points out that during the stage of adolescence, elements of stress are perceived much more accentuated, preventing extension of personality.

Peculiarities of cognitive, volitional and especially affective individual have a very important role in the occurrence and extent of psychological stress. Individual,

family and professional life experiences also play an important role, including here personal or immediate family's psychologically traumatic previous events.

Typically, stress generating situations can be physical (noise, temperature), psychological (fear of failure, conflict, death in the family) or social (social maladjustment, loneliness, etc.) (Rășcanu, 2000, p. 114).

McGrath and Tschan (2004) introduced among stressful situations, in addition to the overstress, those of lack of solicitation (lack of activity, information, etc.). Every individual has an innate need of pointing capabilities, and this need has only been met in those activities in which these capabilities are properly applied. This lack of solicitation occurs quite often in modern life, in some cases of professional or fortuitous isolation with decreased usual stimulation of the cerebral cortex. The emotional lack of solicitation is another form of lack of solicitation, more subtle but more damaging by some unmet social needs (the need for affirmation, for communication, etc.).

3. ANALYSING STRESS RELATED TO CANCER

Soung and Kim (2015) conducted a theoretical analysis of the scientific literature on the relationship between stress and cancer. The authors point out that depression is related directly to stress and induces hypothalamic-pituitary-adrenal (HPA) axis activation.

Anthony et al. (2006) cited by Soung and Kim (2015) have shown that depression and other factors are not predictive of cancer aetiology.

Denaro, Tomasello and Russi (2014) conducted a theoretical study that followed the relationship between stress and cancer in terms of the psychologist and the oncologist. The authors point out that stress plays an important role in cancer development and metastasis.

Riley (1981), Eliyahu et al. (1991), Glaser-Kiecolt and Glaser (1999), Ader, Cohen, and Felten (1995) cited by Denaro, Tomasello and Russi (2014) showed in their research the impact that cortisol, hormones and other neurotransmitters have on the spread of metastasis, and immune mechanism of repair DNA.

Antonova, Aronson and Mueller (2011) presented in a theoretical synthesis the role of stress in the development of breast cancer, based on epidemiological studies until molecular biology studies. Madigan, Ziegler, Benichou et al. (1995) cited by Antonova, Aronson and Mueller (2011) estimate that in approximately

50% of cases the incidence of breast cancer is due to genetic, physiological or behavioural risk factors.

Lillberg et al. (2003) cited by Antonova, Aronson and Mueller (2011) correlated the risk of breast cancer with important life events that took place about 11 years before the appearance of cancerous disease.

Santos et al. (2009) published a meta-analysis having as objective the association between stressful life events and incidences of primary breast cancer in women. Although the authors' conclusion was that you cannot make a direct association between stress and breast cancer, they highlight that, however it is important not to eliminate high-intensity stress as a potential risk factor for breast cancer.

Skarstein et al. (2000) cited by Fish et al. (2014) believe that the high level of psychological distress was significantly associated with low quality of life.

Piet et al. (2012) cited by Fish et al. (2014) are of the opinion that mindfulness based techniques, besides the fact that they have become increasingly used in cancer therapy, they may help lower the levels of psychological distress specific to cancer patients by diminishing fears about the future and ruminations on disease.

4. ANALYSING STRESS RELATED TO IMMUNITY

Balkwill and Mantovani (2001) cited by De Visser et al. (2006) believe that the association between immune system cells and cancer has been observed for almost a century.

Cohen and Rabin (1998) published an article regarding the relationship between psychological stress, cancer and immunity, on the assumption that stress can alter the immune system by influencing the growth and development of tumours in the body.

Burnet (1971) cited by Cohen and Rabin (1998) believes that the immune system is able to eliminate cancer cells that grow normally in the body and that people diagnosed with the immunodeficiency disorders present an increased risk of cancer.

Cohen and Williamson (1991) conducted a theoretical study on the relationship between stress and infectious diseases in humans, considering that there is an increased risk of illness related with stressful situations.

Cohen and Herbert (1996) cited by Cohen and Rabin (1998) initially analysed the relationship between stress and the occurrence of respiratory infections or

autoimmune diseases in terms of psychoneuroimmunology considering the possibility that stress was an important factor in regulating the immune system deficiency. Following these conclusions, the authors believe that stress is a risk factor that increases the chances that any small change regarding the optimal functioning of the immune system to be clinically important by increasing the risk of infections or other immune system disorders, especially in patients following chemotherapy.

Sephton et al. (2009) cited by Denaro, Tomasello and Russi (2014) revealed that depression has been linked to decreased cellular immune response to a variety of specific antigens among patients diagnosed with a form of advanced breast cancer.

De Visser et al. (2006) conducted a study on the role of the immune system during cancer evolution. Thus, the authors believe that during body's fight against foreign pathogens, dendritic cells (DCs) play a key role as the connection between innate (nonspecific) immunity and adaptive (specific) immunity.

Velicer et al. (2004) cited by De Visser et al. (2006) reported that the use of antibiotics would be associated with increased risk of breast cancer. De Visser et al. (2006) stated that after a long period of treatment with antibiotics, the individuals are exposed to a higher risk of cancer because they maintain a low level of chronic inflammation and/or because they fail to normalize their immune status following infection.

5. CONCLUSIONS

The studied literature shows several views on the relationship between cancer, stress and the immune system. Thus, some research shows a strong relationship between cancer and stress, others shows a strong relationship between cancer and the low immune system and other studies highlight that there is a strong relationship between these variables. Moreover, experts highlight that among the determinants of cancer are included: smoking, diet and nutrition, occupational factors (Doll & Peto, 1981), environmental and behavioural factors (Danaei et al., 2005), genetic and hormonal factors (Henderson, Ponder & Ross, 2003). The study of the relationship between cancer, low immune system and stress in the future remains a challenge for both allopathic medicine, psychotherapy, psychosomatic medicine and integrative holistic medicine.

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REZUMAT

În prezent, stresul a devenit un concept important în societatea moderna ceea ce a condus la necesitatea înțelegerii acestuia și mai ales a efectelor negative pe care le are asupra stării de sănătate. Structurile cele mai solicitate astăzi nu mai sunt mușchii, oasele și organele interne, ci zona emoțiilor, mintea și sufletul. Boala secolului XXI este stres-ul, generat de impactul pe care îl are asupra omenirii, o cantitate prea mare de informații ce trebuie prelucrate într-un timp atât de scurt. Expunerea prelungită la stress poate influența în mod negativ starea de sănătate, însoțind de cele mai multe ori parcursul bolii canceroase, favorizând: anxietatea (Burgess et al., 2005), depresia (Spiegel & Giese-Davis, 2003), apariția accidentului vascular cerebral sau a infarctului miocardic (Neelakantan, 2013). Tulburările psihice mai frecvente în bolile neoplazice sunt depresia și anxietatea, care pot să apară în diferite momente pe parcursul evoluției bolii: când se comunică diagnosticul, de-a lungul tratamentelor, în momentul recidivelor etc. Calitatea vieții unui bolnav de cancer scade și datorită influenței negative a bolii asupra sistemului imunitar, mai ales în cazul progresiei și răspândirii cancerului în organism (Andersen et al., 1994).