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Stress related psychiatric disorders

Stressz hatására bekövetkező pszichiátriai kórfolyamatok

Abstract

The objective of the present study is to give an overview of the psychic changes of condition and disorders due to the external and internal effects on the human organism. While the human organism in order to ensure unperturbed conditions for the vital functions is striving to sustain the stability of its internal environment against the constantly changing external and internal effects, these strong and / or chronic effects upset the balance and trigger different disorders. It is obvious that such a chronic stress state does not only have serious psychic consequences, but physiological ones as well. The first part of the study expounds stress in general while the second part describes the consequent pathological processes.

Absztrakt

Jelen közlemény célja a szervezetünket érő külső és belső hatásokra bekövetkező pszichés állapotváltozások, kórfolyamatok áttekintése. Míg az alapvető életfunkciók zavartalansága érdekében a szervezet az állandóan változó külvilági és belső hatásokkal szemben igyekszik belső környezetének állandóságát megtartani, addig az erős és/vagy krónikus hatások felborítják az egyensúlyt és különböző kórfolyamatokat indítanak el. Nyilvánvaló, hogy az ilyen krónikus stressz állapot már nemcsak súlyos pszichés, hanem élettani következményekkel is jár. A közlemény első részében a stressz általános ismertetése, a második részében a bekövetkező kóros folyamatok bemutatása történik.

The human organism is constantly exposed to effects from the environment, which compels response. If any definite factor (factors) can cause potential injury or as a direct or indirect result of this can be detrimental to health or in the worst case lethal, it is dangerous to the living organism.

The unexpected and unpredictable influences and burdens the human organism is subject to have increased psychic and physical effects. Impacts affecting the body are called stressors in physiology, while stress means experiencing events which according to our judgment endanger our psychic and physical wellbeing. These upset our internal balance since the existence of the organism depends on preserving its identity and stability. A living

being is only alive until its condition is not or only slightly different from its condition in the previous moments. To ensure perfect circumstances for the vital functions the organism is striving to keep the stability of its inner environment against the constantly changing external and internal effects, which is realised through the metabolic processes. In physiology the mechanisms ensuring the dynamic stability of the internal environment are collectively called homeostasis. (Homeo=identical, status= state; Greek-Latin.) It was Claude Bernard who introduced the phenomenon of internal environment, so the French expression milieu interieur, which he created, is also often used. If either the nature of the stressor or the condition of the processing system does not allow the organism to restore its stability (homeostasis) the upset balance can trigger pathological processes; organic or psychiatric diseases can develop. Our responses given to these emergency situations, to the temporary or permanent changes in our condition, are not only decisive in our survival, but influence how we fulfill our tasks either in emergency or in normal situations. (That is why work stress has been the main topic of research recently.)

THE CLASSICAL THEORY OF STRESS

The phenomenon of stress was recognised by Walter Cannon and János Selye, who started the research in two basic directions. According to Cannon's theory, perceiving emotionally effecting stimuli result in vegetative changes, which restore the internal balance lost during the condition of emotional stress. He laid the foundation of stress research by introducing the paradigm of alarm reaction by which he meant the immediate symphatic activation in emergency situations. János Selye recognised the key role of the adrenal cortex hormones in the response given to the harmful impacts affecting the organism. He defined stress as a non-specific response to the effect on the organism, the key element of which according to him was the increase of the level of ACTH and glicocortids (1). The significance of his theory is that he recognised the only one physiological response to the several different effects and he identified the main elements of the process. He called the physiological consequences of the increased excretion of glucocorticoid collectively as *General Adaptation Syndrome* (2). Selye suggested that certain effects which impact our emotional vegetative life seriously and harmfully influence our organs and our life. With this he completed Cannon's theory, and he described the General Adaptation Syndrome as a complex process taking place in stages. It is the general, neuro-biochemical-endocrinological-immunological response of the organism to the demanding pressures of any kind, which is realised through the hypothalamus-hypophysis-adrenal cortex (HPA) system. It is a well-known process. The stress on the central nervous system induces the hypothalamus to excrete corticotrope releasing hormone (CRH) (the CRH-receptor density is the largest in the hypothalamus), which results in the formation hormones (ACTH, alpha-MSH, beta-endorphin) in the hypophysis from proopio-melanocortin (POMC) peptid, which account for the complex and complicated further regulation of the stress response. The ACHT activates the adrenal cortex and increases the symphatic tone. The increased corticosteroid level

indicates the activation of the adrenal cortex. The glucocorticoids reaching the target cells through the blood stream exert their metabolic, immune and neurologic effects and with a negative feedback they block their own production. The corticosteroids block the immune system, which is indicated by the decrease of the thymus and the lymph nodes. At the same time the activation of the sympathetic system increases the adrenalin and noradrenalin production in the adrenal medulla. Recent research prove that in some stress types, regarding the functioning of the central nervous system there are similar or identical processes, but there are some very different ones as well. In every stress type it is the hypothalamus-hypophysis- adrenal cortex axis which is activated first, but then the different brain structures (hippocampus, amygdala etc.) participate in the activity of the system in different ways and with different intensity. The functional network of the neurotransmitters, the receptors and some protein structures is also different, thus the gene expression is not the same which will induce different responses (4).

Recent research show that stress response is partly genetically determined and partly under perinatal influence. The mother's stress during pregnancy and the trauma of labour together influence the soundness of the HPA system. Negative effects on the mother and on the labour will later be manifested in decreased stress tolerance. This can be due to the decreased density of cortisol receptors and the decreased sensitivity of the HPA axis. Tests prove that both high and low cortisol levels can determine the behaviour of the individual in stress situations, which can be further influenced by the personality. Individuals with high cortisol level are either dominant or active in fight or subdominant who are ready to retreat. Those having low cortisol level are more likely to develop stress related illnesses.

SELYE'S GENERAL ADAPTATION SYNDROME

The three stages of the general adaptation syndrome:

- alarm or emergency reaction;
- resistance stage;
- exhaustion stage.

Upon encountering stress the organism answers with the so called alarm reaction which is homogeneous regardless of the nature of the stressor. The alarm reaction results in a typical "fight or flight" physiological response of the body to prepare it for the escape from danger or for meeting it. First certain parts of the brain are activated then certain endocrine glands gradually start functioning. As a result hormones are released into the blood stream to reach the different organs which then prepare the body for increased performance (increase heart frequency, raise pulse-beat, as a result muscles are supplied with more oxygen, etc.). In consequence of the alarm reaction the body acutely mobilises its resources to actively cope with the impact of the stressor temporarily. The purpose of this change is to supply the organism with more energy, to channel more blood to the brain and the muscles to prepare the body for rapid reaction. In this sense the alarm response is an *acute* re-

sponse. It is the evolutionary origin fight or flight response: the individual either engages into fight against its aggressor (i.e. endeavours to cope with the situation) or escapes, both ways it needs enhanced performance. The situation is similar in the case of biological responses given to psychological stressors, but the body reacts in a like manner to a virus infection too. The body perceives the impact of a stressor as shock, which sets off its balance and temporarily decreases (or might decrease) the extent of its resistance. The result of the alarm response: the body mobilises its resources and demonstrating enhanced resistance copes with the impact of the stressor temporarily. However, the adaptability or the adaptive energy of the body is finite and exhaustible. This is the essence of the third stage of the general adaptation syndrome described by Selye: if the body is exposed to the impact of the same stressor for a long period or action against the stressors is impossible, signs of exhaustion appear and physical and spiritual malfunctions set in. In conclusion the essence of Selye's theory is that stress is the complex response of the body to every real or potential challenge threatening its selective homeostatic mechanism. Research into the physiological effects of glucocorticoids started by Selye disclosed at an early stage that these effects are wide-ranging and that the rise of hormone level has important energetic, immunologic, endocrinological and neurobiological consequences. In a narrower sense only situations which we consider more or less uncontrollable or unsolvable can be deemed as stress situations. So from the physiological point of view if the organism encounters a - not necessarily harmful - external environmental impact, physiological processes are activated with the aim of preserving its balance. During phylogenesis it was of basic importance to recognise emergency situations as soon as possible and to be able to decide whether to flee or fight. Thus if the fast bodily reaction to a stress situation is flee or fight, the organism generally does not suffer particular harm. However, if there is no possibility to give adequate response to the emerging difficulties, if there is nothing to be done, then the body is exposed to multiple negative effects. This is known as *chronic* stress, which upsets the hormonal balance, and indirectly causes several illnesses. The first reaction of the body to emergency situations is the so called alarm, followed by the stage of resistance and finally by the stage of exhaustion. As we have seen the first stage is not only harmless but is essential for both physical and psychological development. Challenges (even in childhood!) are indispensable for development and to enable us to cope with difficulties facing us during our life. That is why scientists consider coping the twin expression for stress, as one of the most important components of the stress theory. So stress only becomes abnormal if we are not able to cope with the new "dangerous" situations, and its consequence is chronic stress, the state of exhaustion which is clearly harmful.

STRESSOR – STRESS – PSYCHIC CHANGE OF CONDITION

As a consequence of the above the connection between the environmental impacts and the psychic change of condition is determined by two factors: the character of the stressor and the actual and genetically controlled vulnerability and resilience of the stress processing

brain and other organ systems. The external impacts induce stress processes and consequent various pathological conditions in two forms. These are:

1. *acute*:
 - a. usual
 - b. traumatic
2. *chronic*

The usual acute stress impacts include daily encountered situations. Several events cause stress. These are mostly examined on life events which have negative consequences for most people. These are conflicts between individuals, losing a job, break up of marriage, death of spouse, sexual problems, separation, accident or illness, etc. These are thoroughly discussed in the items of the best known life events scale, the Life Event Questionnaire compiled by Rahe. These stressors which are very important for the individual are exceedingly stressful psychologically and can cause tension and unstable disposition; still they can be solved or coped with in normal conditions

The process induced by a usual stressor impact is known as the *basic stress*. It is the stress of our "daily life", we all experience situations which cause increased tension, excitement, frustration, stimulus and anger; the vulnerability of the individual mostly depends on his actual physical and physiological disposition and his vulnerability in the given moment.

Traumatic stressors are impacts when the individual is the subject, eye-witness or involved participant of events which result in dead threat, serious injury, and loss of physical and psychic integrity, to which the individual responds with intensive fear, anxiety, fright, inertia. *Traumatic stress* is the result of intensive, prolonged stressor impact of seriously threatening nature.

Iterative and / or closely consecutive events and effects act as chronic stressors which can induce psychic instability in themselves, but if they accumulate they can trigger indisputably harmful effects and pathological processes. Therefore *cumulative or chronic stress* is the consequence of stressors which have more frequent, more prolonged and more intensive impact than every day stressors.

The practical use of this classification is justified by the work of Gábor Kovács, who conducted his research on stress and stressors with conscripts and professional soldiers. His results proved that the two groups show significant differences in their basic stress and cumulative stress. Basic stress is higher in conscripts, who have to cope with a different, unusual and strange environment, while cumulative stress can hardly be measured in this group. However, the usual environment and its effect can be easily handled by the professional soldiers because it does not present stress to them, while cumulative stress remarkably determines their condition. It ensues from the nature of trauma that the intensity of the condition it induces is the same in both groups (6).

TRAUMA

Trauma means the individual's experiencing, witnessing or being faced with an event involving death or the threat of death, serious injury, inflicting bodily harm and risking his own or others' personal integrity, to which the individual responds with intensive fear, inertia or fright. It is a psychologically intensive shock, the result of which affects the whole body, or an experience, which due to its unexpected nature causes injury in a protective layer, which cannot be treated by the mechanisms we usually treat pain and loss with, so it is not absorbed and stays in the psyche as a "foreign body".

By trauma we mean war-type experiences, aggressive crime, road accidents, natural disasters, child abuse, sexual abuse, domestic violence, sudden unexpected death and life threatening illness.

Following a traumatogen event the traumatised person relives the painful experience, which reels off like a film in front of his eyes while he goes through the same fright and fear. To experience trauma the person does not have to be directly involved in the event, symptoms can appear in eye-witnesses too. Family members of the victims can suffer secondary traumatisation if they become part of the traumatic experience of their relative. Trauma very rarely disappears by itself, without treatment it can haunt a person's life, what is more as a result of transgenerational transmittance it can exert its effect on the ensuing generations. This was mainly observed in the families of the holocaust survivors.

There are no two identical individuals, who would respond to the same event in the same way. Some people exhibit amazing resistance against the psychic effect of trauma, while others seem more vulnerable. What are the risk factors that can predict who are the most endangered or what individual personality traits can support effective effort? Resilience as a personal trait is the most important, but high degree of sociability, active fighting style, trust in directing one's own destiny, stress tolerance are also essential. On the other hand those who are continually exposed to everyday stress, who do not have adequate personal ties, whose socio-ecometric status is low, who experienced traumatising events earlier and who are characterised by lower intellect prove to be more vulnerable. Women, children and adolescents are more susceptible to psychotrauma related illness than adults (7).

DISORDERS GENERATED BY SERIOUS STRESSORS (PSYCHOTRAUMAS)

1. acute stress response;
2. acute stress disorder;
3. acute post-traumatic stress disorder.

Acute stress response is the manifestation of psychic symptoms between 0-48 hours following the trauma. The conduct and behaviour of people in this period is very different, they can produce reactions that are appropriate to the situation, but extreme manifestations of human behaviour have also been observed. Based on their behaviour people can be classified into the following three groups:

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1. type (normal) – prudent, composed, realistic, acting in a rational way. They are 10-25% of the given population.
2. type (blocked) – shocked, impeded, hard to mobilise, acting automatically. 70-75% of the population.
3. type (over-reacting) – disturbed, over-reacting, irrational activity (screaming, crying, running up and down, becoming paralised, panicking). 10-15% of the inflicted population.

Naturally, it is very difficult to define in these unusual situations, which are very far from everyday life, what is normal and abnormal or pathological or not pathological. All the more so, because the acute reactions which can be discerned at this phase are transitional in the majority of the cases. Extreme behaviour can be exhibited from the first minute, in the background of which there are psychic processes taking place. The acute conditions immediately following the trauma, the strong stressor effect, show undifferentiated, polymorph, fluctuating symptoms which are transitional in the majority of the cases and disappear spontaneously or with external supporting help (8). In this phase diagnosis is not possible based on the psychological constellation and behaviour, however if the above symptoms are emphatic and hard to influence we can consider "acute stress disorder", the criteria of which is the evidence of a previous traumatic stressor different in nature and intensity from the everyday effects. *States* that pose threat for the individual and his surroundings demand close supervision and urgent intervention:

- extreme restlessness, being agitated, loss of control, uncontrollable and uninfluencable behaviour, affect controlled violent actions.

There are symptoms and groups of symptoms which anybody can develop in traumatising situations regardless of the person's direct or indirect involvement. These symptoms can be classified under three headings: physiological, cognitive and affective.

- Physiological: exhaustion, distress, fast breathing, fast pulse beat, high blood pressure, muscle tremor, sweating, vomiting, nausea, dyssomnia, nightmares.
- Cognitive: "confusion", fluctuation of conscious integration, difficulty with concentration, loss of memory, being unable to make decisions, psychomotoric slowdown, broken thinking, feeling of guilt, suicidal thoughts.
- Affective: fear, anxiety, anger, rage, irritability, torpor, depression, feeling of loneliness and hopelessness.

It develops immediately or within a few minutes following the event and lasts for ours. If it persists after 48 hours it is obviously a pathological psychic state which corresponds to acute stress disorder.

ACUTE STRESS DISORDER

Acute stress disorder lasts for two days at least and for four weeks at the most. In the majority of the cases it develops immediately after the trauma, but within a maximum of four weeks following the traumatic event. Its frequent symptoms are reduced sense of reality,

depersonalisation, and sense of not being real. Numbing, sense of detachment, lack of emotional responsiveness also often develop subjectively. The patient appears to be a "sleep-walker". Dissociative amnesia is also frequent. Besides these, post-traumatic clusters of symptoms like *re-experiencing the event*, *avoidance* and *hyperarousal* also develop.

Several scientific research prove that apart from acute, serious stress, slighter, but chronic stress also plays an important part in the onset of physical and mental disorders. This is because depending on the circumstances and the condition of the organism, with time our resources run out, which results in rapid decline. Therefore in case of frequently repeated or constant (in this sense *chronic*) stress the body becomes permanently exhausted. This explains the fact that the immune system and resistance of people exposed to greater stress is usually weaker. In consequence besides biological stress effects we also have to count with psychic reactions, disorders (affective, cognitive, and motivational) and changes of behaviour.

POST-TRAUMATIC STRESS DISORDER

PTSD is a typical syndrome which develops after a personal experience related to an extreme traumatic stressor (9). In modern psychiatric diagnostics, apart from the presence of a trauma, DSM – IV. determines 3 main symptom complexes that are critical criteria in diagnosing PTSD. These are re-experiencing the event, avoidance and hyperarousal. Re-experiencing the traumatic event, avoidance and numbing mechanisms, increased anxiety and emotional arousal were conceptually summarised into one clinical pattern the psychoneurosis diagnosis by Abram Kardiner (1941) in which he determined 5 post-traumatic symptom complexes:

1. increased startle reflex and irritability
2. strange dreams
3. susceptibility to explosive and aggressive reactions
4. psychic fixation of the trauma and
5. limitation of the functions of personality

With respect to the concept of Kardiner, which the DSM – IV. diagnostical criteria are built on, and the results of neuroendocrine and neurophysiological research the symptoms of PTSD reflect the pathological inability to modulate arousal. The development of pathological hypervigilance is neuroanatomically connected to the limbic system: to the functional involvement of the amygdala – hippocampus. Neurochemically several data prove the possible pathognostic role of dopamine and glutamate and the decrease of the Gaba-erg function activity. Beside the neurophysical supersensitivity, further symptoms characterising PTSD can be summarised as psychological supersensitivity. Psychological supersensitivity can be recognised in the feeling of violation of security, integrity and self-feeling of the person. The amygdala is not only responsible for controlling the sympathetic protective mechanism, but it also has a role in storing the emotional memories. PTSD, as a complex reaction where fixation mechanisms prevail over adaptation, differs from any other anan-

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castic or affective clinical pattern on the level of biological mechanisms too. In PTSD supersuppression develops during the secretion of cortisol.

SUMMARY

To summarise and conclude this study the following data should serve as lessons. On average 60-70% of the people encounter some kind of serious psychic trauma during their lifetime. 10-15% of them develop a disorder which can clinically be diagnosed as PTSD and 1/3 of them still suffer from certain symptoms even after ten years. According to mass research lifetime prevalence of PTSD in the average population is around 1-2% of frequency projected to lifespan. PTSD develops with different frequency during different traumatising events. In Kessler in his research found the following prevalence data for men (data for women is found in brackets):

Witnessing a crime: 35,6 % (14,5 %), accident: 25,0 % (13,8%), armed threat: 19,0 % (6,8 %), natural disaster (fire): 18,9 % (15,2 %), rape: 0,7% (3,2%), sexual harassment: 2,8 % (12,3%), physical abuse: 11,1% (6,9 %), war: 6,4 %.

The progress of PTSD in time has been tracked by several researches. With victims of rape and of non-sexual crime the frequency of PTSD decreases by time, but in the case of victims of rape it still exceeds 16% even 10-15 years after the traumatic event.

With participants of war situations (soldiers, refugees) the frequency of PTSD is high (with Vietnam veterans it was 29%, with Israeli soldiers 12-25%, with Afghan veteran Russian soldiers 16.5%, with Chechen Russian soldiers 46%). At the changing of the millennium huge groups of refugees carried the effects of the atrocities they suffered in their home countries. Adolescent Afghan refugees were found to have 34% percent of PTSD prevalence. Among children experiencing war trauma in Lebanon the frequency of PTSD was a similar 27%.

Hungarian soldiers were first tested for traumas and related PTSD in 2001. The population of these tests was soldiers who served in SFOR and KFOR. The results show that the rate of PTSD resulting from psychotraumas encountered during the peace keeping mission was 4.2% (5).

My present study aimed at presenting a general overview of stress and its psychic effects. I intend to give a more detailed analysis of the topics expounded in each chapter in the future.

Keywords: homeostasis, stress, General Adaptation Syndrome, psychotrauma, forms of stress disorder

Kulcsszavak: homeosztázis, stressz, Általános Adaptációs Szindróma, pszichotrauma, stressz kórformák

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