

The Pancreatic Secretions are Under Conditions of Emotional Stress

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ABSTRACT

In everyday life, emotional stress is closely related to physical activity. In the process of work, muscle tension is in constant unity with emotional manifestations. Motor activity in combination with positive emotions counteracts hypokinesia, monotony, the development of fatigue, the occurrence of various diseases and helps to increase the overall resistance of the body.

Emotional stress has a significant effect on all body systems. Any human activity is accompanied by certain feelings, sensations and experiences. All these psychophysiological states with individual specifics are usually called emotional. It has been experimentally confirmed that the development of emotional stress is always associated with the significance, strength and duration of the action of emotional stress, as well as with the personality of the subject, his heredity, the nature of education, education and socio-psychological climate at the time of emotional stress.

Keywords: gastric, pancreatic, secretions, normal, conditions, emotional stress

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INTRODUCTION

Recently, researchers have increasingly used the term "emotional stress". Faster pace of life, information overload, physical inactivity and other factors leading to emotional stress are one of the reasons for the ever-increasing neurotic, cardiovascular, gastrointestinal and many other diseases of modern man [1].

Moreover, these studies were performed either in animal experiments.

Among the causes of emotional stress, exam stress is one of the first places. In recent years, significant clinical material has been accumulated, which allows us to argue that passing exams often has a negative effect on the immune, nervous and cardiovascular systems and can even damage the genetic apparatus, creating the prerequisites for the oncological diseases.

It was found that during the examination session, students repair processes are activated, which are responsible for the restoration of damaged sections of the DNA molecule. Examination stress can cause a persistent increase in blood pressure, worsen the immunological status of the body, affect hematological parameters: the number of red blood cells, the hemoglobin content, hematocrit disrupt the autonomic regulation of the cardiovascular system.

The period of preparation for exams and passing exams are accompanied by intense mental activity, a significant restriction of motor activity, a change, and often a disturbance, of sleep patterns, expressed emotional feelings associated with a possible change in the student's social status, and a social assessment of others. All this can lead to overstrain of the regulation mechanisms of various body systems.[2]

After the exams, many physiological parameters rather slowly return to their original state. So, the parameters of blood pressure return to their original values only after a few days. All this gives reason to assert that exam stress should be considered a factor that poses a threat to the health of students and schoolchildren, and the mass character of this phenomenon, annually covering hundreds of thousands of students across the country, makes the problem urgent.

It should also be noted that the emotional stress associated with passing exams is not always harmful, acquiring the properties of "distress". Examination stress can act as a mobilizing factor, stimulating pupils and students to display all their knowledge and personal reserves. In this regard, the ability to control the level of exam stress with the help of knowledge about the mechanisms of stress response implementation is very relevant.[3]

This knowledge is of particular importance and significance for specialists in the field of digestion physiology and gastroenterology, since the gastrointestinal tract is one of the indicator systems in response to stress.

Objective: to study the effect of emotional stress on the secretory function of the stomach and pancreas and to study the mechanisms of neurohumoral regulation of these effects.

To achieve this goal, it seemed necessary to solve the following tasks:

1. To study under conditions of emotional stability and under the influence of emotional stress the role of the autonomic balance of the sympathetic and parasympathetic nervous system in the functional activity of the digestive glands of the stomach and pancreas.
2. To study the effect of emotional stress on the secretion of the liquid part of the gastric and pancreatic secrets, electrolytes and enzymes.
3. To study the effect of various stimulants and inhibitors of gastric secretion under conditions of emotional stability and under the influence of emotional stress.

DISCUSSION

Under emotional stress, specific differences in hormonal profiles in individuals with different levels of autonomic balance were revealed. In the group of persons with equal tone of the sympathetic and parasympathetic divisions, with the maximum increase in pituitary hormones and gastrin under stress, the secretory activity of the digestive glands decreases. In parasympathotonics, the maximum increase in adrenergic activity is combined with a significant increase in the cortisol / insulin index

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and low activity of pituitary hormones and gastrin. Under these conditions, the activity of the digestive glands practically does not change. For persons with a predominance of the tone of the sympathetic division of the autonomic nervous system, activation of the digestive glands under stress is characteristic, combined with a parallel increase in gastrin and aldosterone.

1. Persons with a high degree of neuroticism are characterized by a higher level of stress on the day of the exam in relation to persons with low neuroticism, both in terms of objective characteristics (concentration of hormones in blood serum, blood pressure and heart rate), and according to the subjective assessments of the subjects themselves (SAN questionnaire).

2. The level and direction of changes in gastric secretion under stress is determined by the individual psychological characteristics of the individual. In persons with a low level of neuroticism, suppression of acid and enzyme excretory functions of the stomach was found. In persons with a high level of neuroticism, stimulation of gastric secretion was found under conditions of emotional stress (increased volume of gastric juice, gross excretion of pepsinogen).

3. Under conditions of emotional stress, a change in indicators of the immune function of the stomach was noted. In both groups of subjects, a decrease in the activity of gastric lysozyme was revealed with multidirectional changes in the concentration of sIgA: in individuals with a high level of neuroticism, the content of sIgA significantly decreased under stress, and in individuals with low neuroticism, it increased.

4. Under conditions of emotional stability, individuals with different levels of neuroticism significantly differ in the concentration of serum IgA, which was significantly higher in subjects with low neuroticism.

5. In case of emotional stress, persons with different temperamental properties are characterized by unidirectional changes in most indicators of the immune status. In all subjects under stress, significant stimulation of T-cell immunity was found, which manifested itself in a significant increase in the percentage of T-lymphocytes and the number of T-active lymphocytes in the blood, against the background of a pronounced decrease in the concentration of serum IgG, phagocytic activity of neutrophils and lysozyme activity.

Under conditions of emotional stress, subjects with different levels of neuroticism differ in the nature of changes in the absolute number of B-lymphocytes and the concentration of serum IgA: in persons with a high level of neuroticism, a potentiating effect of stress on these indicators is noted, in persons with low neuroticism, it is suppressive.

Under conditions of emotional stability and under the influence of emotional stress, depending on the autonomic balance of the sympathetic and parasympathetic sections of the autonomic nervous system, the reactivity of the secretory apparatus of the stomach changes in response to the action of submaximal digestive irritants.

Metabolic shifts arising from the action of emotional stress cause changes in the neuroendocrine regulation of the secretory function of the stomach and pancreas.

Under conditions of emotional stress, the stimulating effect of the sympathetic nervous system on the secretory function of the stomach and pancreas increases sharply [4].

Scientific novelty. Neurohumoral mechanisms of regulation of the secretory function of the stomach and pancreas under the influence of emotional stress are described. The results of the studies allowed to obtain the following new scientific data:

The dependence of the functional state of the secretory apparatus of the stomach under conditions of emotional stability and under the influence of emotional stress on the autonomic balance of the sympathetic and parasympathetic sections of the autonomic nervous system is established.

Differences in the resistance of secretion mechanisms of various ingredients of gastric and pancreatic juices to the effect of emotional stress

It was established that under emotional stress the dominance of the sympathetic part of the autonomic nervous system causes an increase in the proteolytic activity of the stimulated gastric secretion, the predominance of parasympathetic influences does not cause such changes, and normotonia is combined with a decrease in the hydrolytic potential of the stomach [5].

Blockade (3-adrenergic receptors) was found to cause a significant decrease in the secretory activity of the gastric and pancreas under conditions of emotional stress.

It was found that blockade of M-cholinergic receptors under conditions of emotional stress leads to marked inhibition of inhibited gastric secretion and does not affect stimulated pancreatic secretion.

It has been demonstrated that the combined effect of emotional and muscle tension removes the inhibitory effect on inhibited gastric secretion.

Compensatory changes in saliva, gastric and pancreatic juices of enzymes from the corresponding enzymatic chains were revealed. With a decrease in the total release of the enzyme in one of the juices, its production rate in the other digestive juice increases, which ensures the gradual breakdown of proteins, carbohydrates and fats.

The dynamics of secretion of STH, gastrin, calcitonin, para-hormone, cAMP, cGMP, cortisol in response to the introduction of a breakfast in the background and under the influence of emotional stress was studied [6].

The dependence of the secretory function of the stomach and pancreas on the level of metabolic shifts that occur during emotional stress is established.

Theoretical and practical significance. The studies performed allowed us to characterize the neurohumoral mechanisms of regulation of the secretory function of the stomach and pancreas under the influence of emotional stress. It has been established that the sympathetic section of the autonomic nervous system under conditions of emotional stress provides a stimulating effect on the secretory apparatus of the stomach and pancreas. Sympathetic patients have the highest reactivity of the digestive glands in response to the action of a submaximal food irritant. The obtained data on a decrease in the bicarbonate / acid index (reflecting the degree of neutralization of pancreatic juice by the bicarbonate coming into the duodenum from the stomach of hydrochloric acid) in some of the subjects allow us to recommend the definition of this index as a prognostic test for identifying persons prone to duodenal pathology under conditions of emotional stress [7].

Data on a sharp decrease in the secretory function of the stomach and pancreas during blockade [3-adrenergic

receptors must be considered when taking pharmacological preparations of this group.

Of interest to specialists in the field of gastroenterology and endocrinology is the dynamics of changes in the hormones of the pituitary gland, parathyroid gland, adrenal cortex, pancreas and gastrin in response to the isolated and combined effect of emotional stress and food intake. It is advisable to consider the results of the study when developing a rational nutrition of individuals under conditions of emotional stress.

The secretory activity of the stomach in conditions of emotional stability is characterized by individual typological features of the balance of the autonomic nervous system, determining various inter-digestive and basal levels of gastric secretion, heterochrony of the main indicators in the dynamics of the secretory response, a decrease in the structural and functional reserve of the gastric mucosa with a dominant tone of the sympathetic autonomic nervous system[8].

Features of the autonomic regulation of gastric secretion are manifested when using a submaximal stimulator of the gastric glands and are leveled with their maximum stimulation and inhibition.

PRACTICAL RECOMMENDATIONS

1. To predict the response of the secretory reaction of the stomach and pancreas to the effect of emotional stress, it is advisable to determine the individual-typological balance of the sympathetic and parasympathetic departments of the autonomic nervous system.

2. To identify persons prone to duodenal pathology under conditions of emotional stress, it is necessary to recommend the determination of the bicarbonate / acid index as a prognostic test (this index reflects the degree of neutralization of the pancreatic juice of the hydrochloric acid entering the duodenum from the stomach).

3. Data on a sharp decrease in the secretory function of the stomach and pancreas with blockade of R-adrenergic receptors must be considered when taking pharmacological preparations of this group.

4. Information on the influence of emotional stress on the secretory function of the stomach and pancreas can be used to scientifically substantiate a rational diet under the action of extreme factors.

Conclusion

Emotional stress inhibits the secretory function of the stomach and pancreas during the inter-digestive period and the neurohumoral phase of secretion. The most sensitive is the mechanism of isolation of pepsinogen and α -amylase. Under conditions of inhibition of the gastric glands under stress, a restoration of the secretory activity of the gastric mucosa is noted.

The reactivity of the secretory apparatus of the gastric mucosa during emotional stress depends on the background activity of the parasympathetic and sympathetic departments of the autonomic nervous system. The maximum inertia of secretory parameters and a decrease in the hydrolytic potential of the stomach are characteristic of normotonic, an increase in proteolytic activity - for the dominance of the sympathetic department, high volume variability and slight secretory shifts - for vagotonia[9].

In groups with extreme values of the autonomic balance (vago-tonics, sympathy-tonics) in the regulation of the secretory activity of gastric and pancreatic secretions, the leading role belongs to the volumes of digestive secretions and the level of electrolytes in them, substrate

regulation is predominant in people with normotonic, which makes it possible to determine their resistance to action stress in the series of normotonic - vagotonic - sympathotonic.

For pancreatic secretion during emotional stress, there are mechanisms of selective ductular, and acinar sensitivity associated with typological autonomic features. The maximum inhibition of amylolytic activity is characteristic for vagotonics, lipolytic activity for normotonic, a decrease in volume and bicarbonates for sympathotonics[10].

The combined effect of emotional stress and physical activity under conditions of maximum stimulation of secretion led to a decrease in the volume of gastric secretion, its proteolytic properties and an increase in the hourly tension of gastric lipase. Pancreatic secretion is inhibited under these conditions, with the exception of gross trypsin, which increased in basal and stimulated secretion.

Under conditions of emotional stress, the role of the sympathetic department of the autonomic nervous system in the regulation of the gastrointestinal tract, the blockade of p-adrenergic receptors by obsidian significantly increases the inhibition of gastric and pancreatic secretions.

Blockade of M-cholinergic receptors with atropine during emotional stress led to a decrease in the volume, electrolytes and proteolytic activity of gastric juice and practically did not inhibit stimulated pancreatic secretion.

The specific dynamic action of food led to a pronounced increase in the concentration of GH, gastrin, calcitonin, the effect of emotional stress reduced the peak secretion of gastrin and calcitonin and changed the dynamics of the hormonal curves of GH, para-hormone, cortisol and aldosterone[11].

During emotional stress, specific differences in hormonal profiles were revealed in individuals with different levels of autonomic balance. In the group of people with an equal tone of the sympathetic and parasympathetic departments, with a maximum increase in pituitary hormones and gastrin, under conditions of stress, the secretory activity of the digestive glands decreases. In parasympathetic, the maximum increase in adrenergic activity is combined with a significant increase in the cortisol / insulin index and low activity of pituitary hormones and gastrin. Under these conditions, the activity of the digestive glands remains virtually unchanged. For individuals with a predominance of the tone of the sympathetic section of the autonomic nervous system, activation of the digestive glands under stress is characteristic, combined with a parallel increase in gastrin and aldosterone [12].

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