Stress - Can a Periodontist handle it?

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INTRODUCTION

Periodontal diseases are opportunistic infections caused by specific periopathogens and their metabolic products. Epidemiological studies indicate several so-called risk factors and risk indicators that may be closely related to the emergence and progression of periodontitis. An increasing number of studies have shown that psychological stress or other psychosomatic conditions lead to immunological changes and/or behavior-mediated effects which may have direct modulating effects on the immune system of the body. Stress is a state of physiological or psychological strain caused by adverse stimuli, physical, mental or emotional, internal or external, that tend to disturb the functioning of an organism which the organism naturally desires to avoid. The onset, progress, and severity of these pathomorphological changes are determined by the individual host response, the latter being susceptible to modulation by various factors.1

History:

In 1936, Seyle developed the concept that physical or mental stress have a profound detrimental effect on the human body.2 The possible interrelationship between stress and periodontal disease was identified by Dean MT, Dean RD in 1945. In 1976 De Marco proposed that in the absence of other obvious causative factors a disease entity exists that he called Periodontal Emotional Stress Syndrome which caused degeneration of periodontal ligament, osteoporosis of alveolar bone, delayed wound healing, and apical migration of the epithelial attachment with pocket formation.3

This concept later evolved into GAS — General Adaptation Syndrome, which was based upon the observation that stress significantly influences endocrine function through hypothalamus and anterior pituitary gland, leading to enlargement and increased function of adrenal cortex. It is divided into 3 phases:
**Alarm Reaction:** activates adrenal cortex to release corticosteroids.

**Resistance Stage:** Corticosteroids to prepare the body to adapt to and resist stressful incident.

**Exhaustion Stage:** This occurs when the causative stressful event is not suppressed.

At this point, the body’s ability to resist is overwhelmed, and damage occurs to target tissues.

Thus, GAS initially exerts a beneficial effect but becomes harmful if the stress continues unabated. This response is further modified by extraneous factors like patients immunological and nutrition status, medications, age and systemic disease.

**Current Pathways of stress:**

**First major pathway:**

Stress can result in deregulation of the immune system, mediated primarily through the hypothalamic — pituitary — adrenal and sympathetic — adrenal medullary axes.

In response to a variety of stressful stimuli on elegant sequence of events is initiated. Activation of the hypothalamic — pituitary — adrenal axis by stress, results in the release of an increased concentration of corticotrophin — releasing hormone from the hypothalamus. The pituitary gland is connected to the hypothalamus by the infundibulum, a stalk of tissue that contains nerve fibres and small blood vessels. Corticotrophin releasing hormone, in turn acts on the anterior pituitary, resulting in the release of ACTH (Corticotrophin).

The ACTH then acts on the adrenal cortex and causes the production and release of glucocorticoid hormones (predominantly cortisol) into the circulation.

The glucocorticoids then produced a myriad of effects throughout the body, such as suppressing the inflammatory response, modifying cytokine profiles, elevating blood glucose levels, and altering levels of certain growth factors. Importantly, it has been established that pro-inflammatory cytokines, such as IL-1 can also activate the hypothalamic-pituitary-adrenal axis, leading to a feedback loop.

Immune function plays a critical role early in the wound healing cascade. Pro-inflammatory cytokines, such as IL-1, TNF-α are just one of the essential cytokines in this regard. It has been speculated that success in the later stages of healing is critically dependent on these events.

**Second major pathway:**

It is to activate the sympathetic nervous system. A well-known example is the so-called Flight or Fight response to potentially harmful stimuli. Stress activates the nerve fibers of the autonomic nervous system, which innervate the tissues of the immune system. The adrenal medulla is actually a modified sympathetic ganglion. Its nerve bodies, instead of possessing axons, secrete their products directly into the bloodstream.
The release of catecholamines results in the hormonal secretion of norepinephrine and epinephrine from the adrenal medulla, which results in a range of effects that may act to modulate immune responses.

Catecholamines, released during stress, contribute to the development of hyperglycemia by stimulating glucose production, interfering with the tissue disposal of glucose. In addition the sympathetic nervous system has a role in regulating immune cell activities.5

Measuring Stress:

Defining stress ranges from subjective assessments of stressful situations, such as during examinations or military service, to physiological measurements, such as plasma cortisol levels, cytokine profiles, and heart rate. A major limitation is that these parameters all show divergent reaction patterns, both within an individual at different time points and between different individuals.6

Detailed case history and current medical status:7

- Depressed mood most of the day (feeling sad, empty, appear tearful)
- Diminished interest or pleasure in all activities.
- Significant weight loss or weight gain.
- Insomnia or hypersomnia.
- Psychomotor retardation or agitation.
- Fatigue.
- Feelings of worthlessness.
- Indecisiveness.
- Suicidal tendencies.

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<th>Plasma Cortisol Levels</th>
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Factors that were associated with increased risk of severe periodontal disease were age, plaque index, and internal and external locus of control.8

Subjects who believed that they did not have control over their disease (external locus), had a disease status than subjects with positive attitude about their ability to influence progression of disease (internal locus). Hence the individual’s ability to combat stress played an important role in the progression of periodontal disease.

Currently, 2 hypothetical conceptual models of the indirect influence of psychosocial stress and stress behavior strategies on periodontal disease are under discussion.

Psychoneuroimmunological model

Inadequate stress coping triggers physiological mechanisms that proceed in a cascade like fashion, influence critical regulatory processes by hormonal mediation.

Behavior - Oriented model

Relates to the role of stress behavior in periodontal disease, like smoking, excessive alcohol consumption, medications, ingestion of unhealthy food.9

Stress management Protocol:

Care should be taken by a Periodontist to ensure that the patient receives information in such a way that it does not cause him/her to become defensive, and that proper access to the disease is established. Patients may then be advised to participate in stress management seminars where they would be able to analyze their stress coping strategies and thus get to know themselves better. This could be an important and integral aspect of comprehensive periodontal treatment in cases of advanced disease and might have a positive effect on a putative risk factor for severe forms of adult periodontal disease.

Rather, a compromise between offering explanation and coping styles promotes the patient’s ability to cope with the current situation. The supportive effect of a specific compromise between coping style and coping behavior at a given time does not necessarily imply that all coping strategies are of equal value in respect to long - term criteria like health or lifespan. The stress coping strategy, as a behavior variable, plays a very important role, especially in cases of failure or relapse. This factor should be given more attention in prevention programs.

In addition to general measures, it calls for specific approaches. Imagination is recommended as one of several cognitive coping strategies: the person imagines how the smoking toxins erode his lungs (aversive imagination) or how the overjoyed family congratulates him on his decision to stop smoking (positive imagination). In association with induced relaxation, this strategy could be modified to the needs of the repressive coping style.10,11
Conclusion:

It may be concluded that passive coping strategies were more pronounced in cases of both advanced diseased and poor response to nonsurgical periodontal therapy, while patients with active stress coping modes had milder disease and a more favorable course of therapy.

Individual stress coping strategies probably contribute to pathological processes in many different ways. In addition to psychoneurogenic immune-modulated effects which may be determined by genetic factors, behavior-oriented phenomena are considered to be responsible for the development of disease.

The results of various studies support a behavior-oriented conceptual model concerning the role of psychosocial stress and inadequate coping strategies in periodontal disease.

Therefore, a history of maladaptive behavior, especially in association with behavior-correlated risk factors, is of special significance in the therapy and maintenance of patients with periodontal disease.

A HOLISTIC approach in treatment plan is the motto which guides the PERIODONTIST for the Best Treatment Outcome in patients battling stress.

References: