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THE NEUROCHEMISTRY OF JOY: EVOLUTIONARY PARALLELS IN HUMANS AND ANIMALS

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ABSTRACT:

Happiness and emotional well-being are regulated by complex neurochemical interactions within the brain. A group of neurotransmitters and hormones commonly referred to as “happy hormones” play a central role in shaping mood, motivation, social bonding, and stress resilience. These include dopamine, serotonin, oxytocin, endorphins, cortisol, and adrenaline. Beyond human psychology, these biochemical mediators are increasingly recognized as key indicators of animal welfare. This review explores the neurobiological pathways associated with happiness, highlights the physiological roles of major mood-related hormones, and discusses management and environmental strategies that promote their release. Understanding these mechanisms offers valuable insights for improving mental health in humans and welfare standards in animals

Keywords: Happy hormones, neurotransmitters, emotional well-being, animal welfare, stress regulation, social behavior.

INTRODUCTION:

Happiness, a central concept in positive psychology, represents a multidimensional emotional state influenced by both internal biological processes and external environmental factors. While life circumstances contribute to emotional experiences, endogenous neurochemical regulation forms the foundation of long-term well-being.

Hormones secreted by the endocrine system influence growth, metabolism, cognition, and emotional balance. Scientific evidence demonstrates that disturbances in hormonal signaling and neural activity are closely associated with mood disorders and stress-related illnesses.

Certain neurotransmitters and hormones possess mood-enhancing and stress-buffering properties and are therefore collectively termed “happy hormones.” These include dopamine, serotonin, oxytocin, and endorphins, along with regulatory hormones such as cortisol and adrenaline.

Emerging research has also highlighted the roles of phenylethylamine and ghrelin in emotional regulation. Lifestyle factors such as physical activity, nutrition, social bonding, and human–animal interactions significantly influence the secretion of these neurochemicals, thereby affecting overall well-being

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AIM AND OBJECTIVES

Aim

The aim of this study is to critically evaluate the role of happiness-related hormones in regulating emotional well-being, social behavior, and stress responses in humans and animals, and to highlight their significance as indicators of overall welfare.

Objectives

- To describe the neurobiological mechanisms involved in happiness and emotional regulation.
- To analyze the physiological roles of major happy hormones such as dopamine, serotonin, oxytocin, endorphins, cortisol, and adrenaline.
- To examine the influence of environmental, dietary, and social factors on the release of these hormones.
- To assess the relevance of happy hormones as biomarkers for animal welfare and human mental health.
- To emphasize management strategies that enhance emotional well-being through hormonal balance

MATERIAL AND METHODS:

This article is a narrative review based on previously published scientific literature. Relevant research articles, review papers, and experimental studies were collected from peer-reviewed journals in the fields of neuroscience, endocrinology, psychology, veterinary science, and animal welfare.

Electronic databases such as PubMed, Google Scholar, and ScienceDirect were used to retrieve literature using keywords including happy hormones, dopamine, serotonin, oxytocin, endorphins, stress hormones, animal welfare, and human well-being. Selected studies were analyzed to understand hormone synthesis, neurobiological pathways, behavioral outcomes, and welfare implications. Information was systematically organized and interpreted to present a comprehensive overview of happiness-related hormonal mechanisms.

NEUROBIOLOGICAL PATHWAYS ASSOCIATED WITH HAPPINESS

The human brain, comprising approximately 86 billion neurons, functions through intricate electrical and chemical signaling networks. Emotional experiences arise from coordinated activity across multiple brain regions, including the prefrontal cortex, amygdala, hippocampus, anterior cingulate cortex, and insular cortex. Although happiness cannot be localized to a single anatomical site, these areas collectively regulate emotion, motivation, memory, and decision-making.

Neurotransmitters serve as chemical messengers across synapses, modulating neuronal communication. The limbic system plays a crucial role in emotional processing, while the nucleus accumbens and basal ganglia are integral to reward and reinforcement mechanisms. The

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hypothalamus acts as a vital link between the nervous and endocrine systems, orchestrating hormone release that directly influences mood. Among several reward circuits, the mesolimbic dopamine pathway is the most extensively studied due to its role in motivation, pleasure, and adaptive behavior.

Dopamine

Dopamine, often referred to as the "reward molecule," is central to motivation, reinforcement learning, and pleasure-seeking behavior. It belongs to the catecholamine family and is synthesized primarily in the substantia nigra and ventral tegmental area of the midbrain. Dopamine production depends on the amino acids phenylalanine and tyrosine through well-defined metabolic pathways.

Optimal dopamine levels promote goal-directed behavior, focus, and emotional satisfaction. Reduced dopamine activity is associated with anhedonia, a condition marked by diminished pleasure. Dopaminergic signaling also plays a vital role in animal behavior by reinforcing survival-related activities such as feeding and social interaction. External substances like nicotine and alcohol can artificially elevate dopamine levels, highlighting its involvement in addiction and reward dependency.

Serotonin

Serotonin, chemically known as 5-hydroxytryptamine, is widely recognized for its role in promoting emotional stability and happiness. Synthesized from the amino acid tryptophan, serotonin regulates sleep, appetite, mood, and social behavior. Its neuronal cell bodies are primarily located in the brainstem, with extensive projections to the cortex, limbic system, and basal ganglia.

Low serotonin levels have been strongly associated with depression and anxiety, while balanced levels contribute to calmness and emotional resilience. In animals, serotonin has additional physiological significance. Research has demonstrated its involvement in calcium regulation and lactation in dairy cows, suggesting that emotional well-being is closely linked to productivity and health in livestock.

Oxytocin

Oxytocin is a peptide hormone and neuropeptide synthesized in the hypothalamus and released via the posterior pituitary gland. Commonly known as the "bonding" or "love" hormone, oxytocin facilitates trust, attachment, and social bonding. It is released during positive social interactions, maternal care, and physical touch.

In both humans and animals, oxytocin enhances affiliative behaviors and reduces stress by modulating the hypothalamic–pituitary–adrenal (HPA) axis. Studies have shown increased oxytocin levels following human–animal interactions, particularly between dogs and their owners. In farm animals, higher oxytocin

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concentrations are associated with improved maternal behavior, enhanced milk let-down, reduced cortisol levels, and overall better welfare.

Endorphins

Endorphins are endogenous opioid peptides that function as natural pain relievers and mood enhancers. Produced by the pituitary gland and central nervous system, they are released during physical exertion, laughter, social bonding, and pleasurable activities. Endorphins reduce pain perception and generate feelings of euphoria and relaxation.

In animals, endorphin release has been observed during positive human interaction, such as petting or play. This mechanism underpins the therapeutic benefits of animal-assisted therapy, which has been shown to alleviate stress, anxiety, and depression in humans while simultaneously enhancing animal welfare.

Cortisol

Cortisol, a glucocorticoid hormone secreted by the adrenal glands, plays a crucial role in stress regulation and metabolic balance. Although essential for coping with acute stress, chronically elevated cortisol levels are associated with anxiety, depression, and reduced well-being. Salivary cortisol is widely used as a physiological marker of stress in both humans and animals.

In animal welfare science, cortisol measurement provides valuable insight into environmental stressors and management practices. Lower and more stable cortisol levels are often correlated with positive emotional states, social enrichment, and improved living conditions.

Adrenaline

Adrenaline, also known as epinephrine, is released during stressful or threatening situations as part of the fight-or-flight response. It prepares the body for rapid action by increasing heart rate, respiration, and energy availability. While necessary for survival, prolonged adrenaline activation may contribute to emotional imbalance. Studies suggest that individuals with a strong sense of purpose and personal growth exhibit more stable adrenaline levels. In veterinary medicine, adrenaline is clinically used to manage emergencies such as anaphylaxis and cardiac arrest.

RESULTS:

The review reveals that happiness and emotional stability are strongly influenced by a coordinated interaction of neurotransmitters and hormones. Dopamine was found to be central to reward processing, motivation, and pleasure-seeking behavior. Serotonin plays a crucial role in mood stabilization, emotional balance, and physiological functions such as sleep and appetite regulation. Oxytocin emerged as a key hormone in social bonding, trust, maternal behavior, and stress reduction in both humans and animals.

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Endorphins were identified as natural analgesics that reduce pain perception and enhance positive emotions during physical activity and social interaction. In contrast, cortisol and adrenaline were primarily associated with stress responses; however, their controlled release is essential for survival and adaptation. Elevated cortisol levels were consistently linked to poor emotional states and reduced welfare, whereas stable hormonal profiles were associated with positive behavior and improved health outcomes.

Animal studies demonstrated that positive human–animal interactions, natural housing systems, grazing, and social enrichment significantly increased levels of oxytocin and endorphins while reducing cortisol concentrations, indicating improved welfare

DISCUSSION

The findings emphasize that happiness is not merely a psychological construct but a biologically regulated state governed by complex neurochemical interactions. The balance between reward-related hormones and stress hormones determines emotional resilience and overall well-being. Dopamine and serotonin promote motivation and emotional stability, while oxytocin strengthens social bonds and reduces stress, making it particularly significant in both human mental health and animal welfare.

The discussion highlights that management practices, environmental enrichment, physical activity, nutrition, and social interactions play a vital role in stimulating the release of happy hormones. In animals, welfare-friendly practices such as natural rearing systems, maternal bonding, and positive human contact contribute to healthier hormonal profiles. Similarly, in humans, lifestyle interventions that promote physical exercise, social connection, and emotional support enhance hormonal balance and psychological well-being.

These insights suggest that happy hormones can serve as reliable biological indicators for assessing welfare and designing interventions aimed at improving quality of life

CONCLUSION

Happiness and emotional well-being are deeply rooted in neurochemical regulation involving multiple hormones and neurotransmitters. Dopamine, serotonin, oxytocin, endorphins, cortisol, and adrenaline collectively shape mood, motivation, social behavior, and stress resilience. These biochemical markers are not only central to human mental health but also serve as reliable indicators of animal welfare.

Promoting environments and management practices that encourage the natural release of happy hormones can significantly enhance quality of life for both humans and animals. Future research should further explore the interplay between neurobiology, behavior, and

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environmental factors to develop evidence-based strategies that foster emotional well-being and sustainable welfare outcomes

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