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BIOLOGY OF HUMAN BEHAVIOR: ITS ESSENTIAL ASPECTS

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ABSTRACT

In terms of Biology humans are just another species on this planet, but when it comes to explaining the biology of the context of Human behavior, it really becomes very tough. Humans have the physiology and anatomy similar to that of a cave man, yet the level of our intelligence has far evolved in comparison to the extent that the cave man anatomy and physiology becomes inadequate to serve to the needs of certain aspects of human intelligence of modern times which essentially functions beyond the level of just survival (for example in animals), and is capable of performing such advanced functions as retaining a huge past memory and can anticipate a future situation. This in many ways has made us far superior to the animal world, yet many of us get messed up in handling our intelligence properly and either develop chronic stress, indulge in violence or mishandle the adolescence related issues of our teenagers. Biologically speaking human behavior is determined largely by how our brains are shaped by developmental and evolutionary processes, at the heart of which lies the genetic and epigenetic changes and environmental impact. Because at any critical moment brains are to decide about any bit of a behavior, therefore the knowledge of underlying brain anatomy and physiology is important. This article is about explaining how biology makes a sense to human behavior and is essentially focused on its three important aspects, i.e. adolescence, chronic stress and violence, which are described in detail in the following paragraphs.

KEYWORDS: *Amygdala, Brain Reward System, Dopamine, Endocrinology, Homeostasis, Neuropsychology, Prefrontal Cortex. Striatum.*

INTRODUCTION

Human behavior is a whole range of physical and emotional actions and interactions that the humans engage in, biologically, socially, intellectually etc. and is influenced by value, ethics, authority, attitudes, persuasion and or genetics. Because our behaviors determine our welfare or misery as human beings, it is pertinent to understand all those forces operating behind any perceivable human behavior and devise ways and means by managing them to make human life beautiful, purposeful and above all peaceful. Following are the three important aspects of Human behavior and the biology behind them:

1. Teenage related behavior: Teenage is a period when components of the limbic system of brain associated with the brain reward system namely striatum, nucleus accumbens, hippocampus etc create a variety of high intensity pleasurable responses in adolescents in comparison to that in adults for the same sort of stimuli like food sex, music, etc; the kind of behaviors fundamentally linked to our survival. This is a normal part of developmental process and happens because the prefrontal cortex is half baked yet and is unable to fully regulate the activity of this part of limbic system allowing it to go for a full blast due to dopamine activity. This high intensity feeling of pleasure in adolescents is associated with memory and learning which motivates them to seek and repeat such behaviors very often. In a way this is remarkable as the adolescents in this period of life take many bold and innovative steps under the motivation of seeking rewards without caring too much for the consequences. The same thing declines in adulthood getting balanced as the prefrontal cortex becomes fully developed nearly by the age of 25years, which by a cross talk can regulate the activity of brain reward system. The teenagers require a little guidance from the side of their parents and teachers without too much authoritative control, to make up for the deficiency of prefrontal cortex at this point in time so that they may cope with all kinds of pressures with confidence and responsibility.

The brain reward system however is prone to be hijacked by many psychotropic drugs which cause an unregulated dopamine activity in the brain reward centre leading to a pathological euphoria and addiction. The drug addict simply cannot experience the normal pleasures in response to behaviors linked to survival e.g. food, sex etc. and indulge in behaviors associated with seeking and consuming drugs by all means. This situation is alarming which demand an understanding of the gravity of crisis and requires a proper counseling and rehabilitation of drug victims who should not be harassed, punished or neglected socially as the drugs tend to pathologically strengthen certain neural pathways and make the others sluggish by affecting the activity of neurotransmitters, synaptic communication and neuroplasticity. The damage is so serious that a mere will power of the victim as is often talked about doesn`t work to reverse the altered biochemistry of the brain under the influence of chronic drug abuse because the

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cognitive ability of the brain fails miserably to control the compulsive behavior arising out of a craving to seek and use drugs by the addicts. Once the reward centre rewires itself under drug influence the brain begins to associate certain people, places, events and activities with the addiction reward which trigger behavioral/biological cues that can be violent at times. In no uncertain terms addiction is brain disease that must be treated with recovery. In the case of adolescents, the situation is even the more serious because of their tendency to seek new experiences and their developing brain can be irreversibly damaged beyond repairs by narcotics and other substance of abuse.

2. Behavioral aspects of Stress response: Stress is a physiological and psychological imbalance arising out of disparity between situational demand and individual`s ability and motivation to meet those demands. Amygdala, a component of limbic system is central to initiate the stress response whose activity gets strengthened over a period of chronic stress at the cost of other vital brain centres like hippocampus and frontal cortex concerned with cognition and memory which suffer deterioration.

When someone experiences a real or perceived threat, amygdala reacts fast even not waiting for the inputs from the frontal cortex and stimulates hypothalamus to initiate a twofold stress response; one through sympathetic part of autonomic nervous system with the end result of adrenaline release from adrenal gland and consequential "fight or flight response" and the other by releasing adrenocorticotropic release hormone, activating HPA (hypothalamo- pituitary- adrenal axis) with the end result of glucocorticoids release from adrenal gland and a prolong effect of stress response on the body.

When the stress is quite frequent and merely for psychological reasons, it becomes a chronic stress and manifests itself as hyperactivity of amygdala, suppression and regression of hippocampus and frontal cortex affecting memory and cognition. Other symptoms are; high blood pressure, cardiac dysfunction, diabetes, gastric dysfunction, immune suppression, reproductive dysfunction, insomnia, obesity etc. This all happens because most of our blood supply is diverted to muscles and organs associated with “fight and flight” under neuroendocrine control at the cost of other vital organs. This suggests that stress response is prima facie a disorder itself, but the fact is that the ability of our body to initiate stress response is very fundamental to our survival. When evoked against the real threat, it enhances the chances of our survival but if activated merely for psychological reasons which happens very often when we anticipate a future threat though there is not a real one or get struck by the thought of a horrible past experience, we turn on body's ultimate defense mechanism in the form of stress response which turns body`s own strength against itself. This appears to be a result of fast evolving Human intelligence in comparison to the pace of evolution of underlying physiology and anatomy which is still of that of a cave man and seems insufficient to fulfill the modern needs of our intelligence. In this connection it is important to reflect on the concerns of human welfare by introducing ways and means of managing stress through psychosocial support and adapting healthy life styles like physical exercise, yoga, meditation etc.

3. Violence related Behavior: Violence is intentional use of physical force or power threatened or actual to harm oneself or others. Humans are miserably violent species though they are equally altruistic and compassionate too. As an intelligent spp. we denounce violent behaviors, but actually we hate the wrong kind of violence only and when it is of right kind according to us we glorify it and love it. In certain settings pulling the trigger of a gun is crime and in others it is a heroic act. In some cases, putting your hand on someone else's is deeply compassionate and in others it is a deep betrayal. So, when it comes to violence, we are a confused human species and the real challenge is to understand the biology of the context of violent behavior.

Let us have a thought experiment; you have a gun and there is rioting and violence around you. A stranger holding something in his hand looking like a gun or a cell phone is running towards you and having perceived an imminent threat you pull the trigger. It turns out later that the person was actually holding a mobile phone and not a gun. Now a biological question can be asked as to what caused this behavior. To find an answer one must know what activity was going on in the amygdala seconds before you pulled the trigger. Obviously, the sights and the sounds of rioting are pertinent but you are more likely to pull the trigger if that person was a stranger, male and of a different race. Moving further minutes to hours back, if you were in pain frustrated or hungry, your frontal cortex (which controls the activity of amygdala) is going to be sluggish, letting amygdala to go ahead unilaterally and cause this violent behavior. Going further back days to weeks in to the realm of hormones, e.g if stress hormones were high, they make the amygdala more excitable and at the same time frontal cortex more sluggish and atrophied by strengthening the synaptic communication through neuroplasticity in the former and with the opposite effect on the later. Pushing even back into the adolescent period, where the central fact of adolescent brain is that it is all set for a blast except for the frontal cortex which is half baked and all those childhood experiences can influence the frontal cortex making it relevant to pulling the trigger in this critical moment. But remarkably enough we have to move even further back into early childhood and fetal life when the brain is being constructed and epigenetic changes triggered by mother's hormonal status can activate certain genes and turn off others, thus affecting brain development; e.g. high level of mother's stress hormones during fetal life can produce amygdala in a highly excitable form in adulthood, causing increased release of stress hormones thereby enhancing the tendency towards violent behavior.

Thus, human behavior related to violence is interplay of various biological, psychological, environmental and social factors all of which need to be considered while managing violence at the individual level and in the society at large.

CONCLUSION

From the foregoing discussion it can be concluded that the human behavior is so complex and weird that to explain every

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bit of it requires knowledge of what happened seconds before an event to millions of years back during evolution and everything in between. In other words, every bit of behavior has multiple levels of causality. But there is every possibility of modification of our behaviors to suit the needs of modern times. Genetics and epigenetic changes at the heart of biology which determine our behavior to a large extent doesn't function in isolation but by interacting with environment. It is here that the key lies i.e. by working on self through inner management/spiritual awakening as individual human beings and at the same time continuing working on the betterment of external situations at the community level, we can fix our neuropsychology and endocrinology in an optimum state of homeostasis to be healthy, peaceful and joyful which is fundamentally required for excellence in all our endeavours to achieve human wellbeing. People can adapt to healthy life style activities like brisk walks, yoga, meditation etc. Many studies have shown that people having strong social bonds and enjoying close relationships with their spouses or friends live a long healthy and successful life apart from the ability to cope with stress effectively at the time of crises. This type of self-empowerment through individual transformation means an understanding that "our goal is not to become super humans but to get a realization that being human is super."

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