

**THE SOCIAL MONOGAMOUS SELECTIVITY: A PRIMAL FEATURE OF HUMANKIND**

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**Abstracts:** The singularity of social monogamy with ideational selectivity seems to be a compulsive behaviour of humankind for its own survival and identity, so evolved during its ontogeny through the dynamical interplay of neuroendocrine and neuromorphological correlates that seem to evolve through the demands of the individual and human species. The optimal synthesis of oxytocin, arginine-vasopressin peptide (AVP), dopamine and opioids seem to define and profile the spectacle of social monogamy, that seem to have far-reaching implications of varied social pathologies that have plagued the qualia and fabric of human society.

**Key Words:** Monogamy, oxytocin, arginine-vasopressin (AVP), sociality, parental.

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**Introduction**

The mammalian offspring depend on their parents or specifically on mother/allomother for their nourishment and care. Substratum to this parent and offspring relationship is provided by the various hormones involved in parturition and lactation.<sup>1</sup> The mother-child relationship has evolved in part along the foundation of dynamic interaction of these hormones and receptors. A Neurophysiologically equilibrated level of Neuro hormones and neurotransmitters like oxytocin and its neuropeptide analogue, arginine-vasopressin (AVP), dopamine and opioids<sup>2,3,4</sup> forms the basis of this relationship. This interaction further aids in preservation of the male female pair relation, eventually not allowing a male to accept, even a sexually receptive female. Such a set of behaviour-complex, evolving as a consequence of these molecules and their respective receptors have been neuroendocrinologically implicated as the basis for Social Monogamy.<sup>5,6</sup>

Although monogamy has also been defined on the basis of genetics or the mating behaviour, the social monogamy can be described as individuals of opposite sex, living together as pairs with lasting pair bond, even after the end of mating season, ultimately jointly defending resources for their survival and their offspring inculcating and

upholding the premise and concept of a family and common ancestral lineage.<sup>7, 8</sup> This selective social bond imparts, mating exclusivity for both sharing a common milieu.<sup>9, 10</sup> This relationship may persist between the two, for several seasons, even if they don't have an offspring.<sup>11</sup> The male partner is the alloparent or philopatric helper in the natal family, foregoing the opportunity to reproduce directly. The process and phenomenon of Social Monogamy is in effect an evolving and evolutionary neuro-endocrinological and neuro-humoral phenomenon that has grown and developed along the timeline of human species aggrandisement and acculturation.

The posterior pituitary hormones, viz. Oxytocin and Arginine-vasopressin peptide (AVP), play a critical role in this selective and long-lasting social bonding and act fast along the ordained timeline.<sup>12, 13</sup> Oxytocin and relative peptide of oxytocin, AVP released from the brain have a wide distribution of its receptors in our body<sup>14, 15</sup> and due to their structural homology and their receptors' similarity, are neuropeptides that supposedly have interactions at various levels across disparate planes. This dynamic interaction between oxytocin and AVP, perhaps in tandem, governs the behavioural and emotional processes.<sup>16, 17</sup> This interplay between the two neuropeptides,

regulating the social behaviour could be attributed to the its evolution from a more primitive, Vasotocin, with a structural and functional homology.<sup>18</sup> Both these neuropeptides, along with other neural peptides inclusive of dopamine and opioids, play an integral role in exhibiting, the selectively social behaviour, characterising, pair bonds and specific parental behaviour.<sup>19, 20</sup> Several functions of Oxytocin, in turn are achieved through stimulation of AVP receptors. This includes, in part, inhibiting the guarding behaviour, that allows an individual to be more social and interactive.<sup>21, 22, 23</sup>

### Action of Oxytocin

- Oxytocin has been implicated in social bonding and affiliative behaviour in both partners and has been regarded as hormone of "love". It seems to be the neuroendocrine entity responsible for the crow-gatherer attitude of humans, inducing a diagonal paradigm shift from nativity of being a hunter-seeker.
- Since the discovery of oxytocin in 1906<sup>24</sup>, this neuropeptide has been widely investigated and known for its crucial role during human labour, birth and milk ejection for the newly born.
- The AVP along with oxytocin also plays an important role in regulation of birth.<sup>25</sup>
- Oxytocin also allows immobility by allaying fear in context of perceived safety in the presence of offspring or partner.<sup>26</sup>
- Oxytocin is essential for maternal<sup>27</sup> and paternal behaviour<sup>28,29</sup> towards their offspring. Moreover, it promotes sociality between adults also.<sup>16</sup>
- Oxytocin along with AVP enables pair bonding, selective sociality and support physical mobilisation and defensive aggression that essentially is critical to male mammal behaviour, so acquired during the neurophysiological plasmatic soup of AVP and Oxytocin.<sup>30,31, 22</sup>

### Actions of Arginine-Vasopressin (AVP)

- AVP underlies the behaviour of both, selective sociality and selective aggression,<sup>13, 32</sup> buttressed and reinforced by rise in AVP levels, along with augmented sensitivity of its receptors, that seems to be facilitated by the neuro-endocrinological process of mating.<sup>33, 34</sup>

- Post-mating rise of AVP levels, has been implicated in selective preference of male along with guarding behaviour towards his female partner, as evidenced by a significant correlation of high levels of AVP in plasma, soon after parturition.<sup>35</sup>
- The fine-tuned cocktail of neurohormones and neurotransmitters of oxytocin and its neuropeptide analogue, arginine vasopressin, dopamine and opioids in the neurophysiologically equilibrated levels, in a mated male (neuro-endocrinologically pliant), leads to rejection of, even sexually receptive another female also.<sup>36</sup> This monogamous behaviour is essential in preservation of male-female pair-bond.
- Both the selectively affiliative along with aggressive behaviour of male towards the female partner and non-partner, respectively, plays a crucial role in maintaining social monogamous system with sustenance and survival of a mammal offspring, as has been observed in animal studies.<sup>13, 37</sup>

### Role of Nucleus Accumbens

- Nucleus Accumbens in brain has been implicated in the reinforcement and-reward ambience, is influenced and modulated both by societal and hormonal influences, with low levels of oxytocin receptor density predisposing an being individual less inclined to the singularity of alloparenting.<sup>38</sup>
- A greater parental care in childhood has been associated with greater alloparenting behaviour and also promotes male female pair bonding later on,<sup>30, 39, 40</sup> a behaviour that has been implicated due to plastic morpho-functional changes within Nucleus Accumbens with enhanced expression of oxytocin receptors that results in lasting selective sociality.<sup>41, 42</sup>

### Applications

The above premise of Social Monogamous Selectivity and its Neuro-endocrinological and Neuro-humoral underpinnings, open new vistas in the management of cases of infidelity and sexual harassment at work-place or at home, wherein levels of the above cocktail of neurohormones and

neurotransmitters could be assayed and managed accordingly.

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