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Review Article

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Physicochemical and Biological Study of Kayoynanite Exuded by Humano-Murian Subjects

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Abstract

Kayoynanite is a lipoproteic sudoral secretion produced by approximately 10% of juvenile humano-murian subjects, designated Kayoynan. This study characterizes its physicochemical properties, neuro-analgesic mechanisms, endocrine effects, and ritual functions within the Mnolahma Nelca cultural framework. Spectroscopic and chromatographic analyses indicate structural homology with arylcyclohexylamines, a chemical class whose members commonly act as non-competitive antagonists of N-methyl-D-aspartate receptors (NMDARs). Kayoynanite also forms a hydrophobic cutaneous polymer upon exposure to cold air and activates early endocrine developmental pathways. These findings identify kayoynanite as a multifunctional xenobiomolecule combining biomaterial, neuromodulatory, and endocrine-inducing properties.

Keywords: Kayoynanite, Arylcyclohexylamine, NMDA receptor modulation, Cutaneous polymerization, Endocrine induction, Xenobiology, Mnolahma Nelca

Introduction

Field investigations conducted by the IFPEA have identified a distinctive phenotype among juvenile humano-murian populations: the Kayoynan phenotype. Affected subjects produce a dense, opalescent sudoral secretion, termed kayoynanite, and display marked analgesia, exceptional cold tolerance, and prolonged contemplative immobility. The co-occurrence of neurological, thermal, and developmental traits suggests that kayoynanite is not a simple exocrine product but a multifunctional biological mediator. Its suspected relationship to arylcyclohexylamine chemistry is biologically plausible, since this class includes compounds such as ketamine and phencyclidine that antagonize NMDA receptors and produce analgesic, anesthetic, and dissociative effects [1][2][3].

NMDA receptors are glutamate-gated, calcium-permeable ion channels involved in excitatory synaptic transmission, synaptic plasticity, learning, and memory [4][5]. Their blockade reduces neuronal excitability and pain signaling, providing a coherent framework for interpreting the neurobehavioral effects of kayoynanite [6][7]. This study aimed to characterize the molecular structure, physical behavior, neuropharmacological activity, endocrine effects, and cultural significance of kayoynanite.

Materials and Methods

Subjects and Sample Collection

Fresh kayoynanite samples were collected from 42 Kayoynan subjects aged 7-12 years, following protocol IFPEA-XC-12. Collection was performed under controlled temperature and humidity conditions to minimize premature polymerization. Samples were divided into aliquots for structural analysis, biological testing, and thermal characterization.

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Physicochemical Characterization

a) Proton and carbon-13 nuclear magnetic resonance spectroscopy ($^{1}H/^{13}C$ NMR).

b) Electrospray Ionization Mass Spectrometry (ESI-MS).

c) High-Performance Liquid Chromatography (HPLC).

d) Fourier-transform infrared spectroscopy for polymer-film characterization.

e) Contact-angle and thermal-conductivity measurements of polymerized films.

Biological Assays

Neuropharmacological activity was assessed using NMDA-R+ murine neuronal cultures. Electrophysiological recordings measured receptor-mediated calcium influx, channel-opening frequency, and action-potential generation. Behavioral assays evaluated nociceptive thresholds, cold tolerance, reflex latency, and spontaneous locomotor activity. Endocrine effects were quantified by measuring transcriptional activation of GATA-4 and PAX-7, together with downstream developmental markers.

Ethnological Assessment

Ritual uses were documented through participant observation and structured interviews within Mnolahma Nelca communities. Particular attention was paid to the route of administration, dose, frequency, age of initiation, and reported subjective and physiological effects.

Results

Molecular Structure and Arylcyclohexylamine Scaffold

Common Pharmacophore: Arylcyclohexylamines are defined by a shared scaffold comprising a cyclohexyl ring bearing, on the same carbon atom, an aryl group-usually phenyl-and an amine function [2][3]. This aryl-cyclohexyl-amine arrangement constitutes the principal pharmacophore associated with NMDA receptor antagonism [1][2]. For kayoynanite, $^{1}H/^{13}C$ NMR and ESI-MS data support conservation of this scaffold:

Chlorinated aryl group - C*(cyclohexyl ring) - NH-R

where C* denotes a putative stereogenic center and NH-R represents a lipoproteic substituent. The chlorinated aromatic ring and lipoproteic chain distinguish kayoynanite from classical synthetic arylcyclohexylamines.

Comparison with Ketamine: Ketamine, the reference compound, has the molecular formula C13H16ClNO and the chemical name 2-(2-chlorophenyl)-2-(methylamino) cyclohexanone [1][3]. It contains a cyclohexanone ring, an ortho-chlorophenyl group, and a methylamino substituent [1][3] (Table 1). Kayoynanite exhibits 82% structural homology with ketamine. The similarity is concentrated in the arylcyclohexylamine core, whereas the lipoproteic chain represents the principal structural divergence.

Table 1

Structural Element	Ketamine	Kayoynanite
Central ring	Cyclohexanone [1][3]	Modified cyclohexyl ring
Aryl group	2-chlorophenyl [1][3]	Chlorinated aryl homolog
Amine function	Methylamino [1][3]	Secondary amine linked to a lipoproteic chain
Stereochemistry	Chiral C2 center; S- and R-enantiomers [1][3]	Putative chiral center; unresolved configuration
Emergent property	NMDA receptor antagonism [1][6]	NMDA antagonism and cold-induced polymerization

Cyclohexyl Ring: The cyclohexyl ring is essential for NMDA receptor activity in arylcyclohexylamines. In phencyclidine-derived compounds, conservation of this ring is associated with maintained antagonistic activity and dissociative effects [2][3]. Its three-dimensional geometry favors insertion into the open NMDA receptor channel [2][3]. In kayoynanite, ^{13}C NMR chemical shifts suggest a partially oxidized cyclohexyl ring that does not exactly reproduce the ketone function of ketamine. This modification may reduce the duration of neuroactive action while promoting the cold-induced polymerization observed experimentally.

Chlorinated Aryl Group: The chlorinated aryl group increases molecular lipophilicity and stabilizes the orientation of the molecule within the intracanalar binding site. Ketamine is notable among classical arylcyclohexylamines for possessing a chlorine substituent on its aryl ring [2][3]. This substitution is associated with modulation of pharmacological potency and analgesic profile [1][3]. For kayoynanite, the ESI-MS isotope pattern is compatible with the presence of one chlorine atom. The chlorinated aromatic fragment is therefore likely involved in affinity for the PCP/NMDA intracanalar site, while the lipoproteic chain provides secondary interactions with membrane lipids.

Stereochemistry and Activity: Many arylcyclohexylamines possess a chiral center at the carbon bearing the aryl and amine substituents [2][3]. Ketamine exists as S(+)-ketamine and R(-)-ketamine; the S-enantiomer has higher affinity for the NMDA receptor site than the R-enantiomer [1][3]. Kayoynanite likely

possesses an equivalent stereogenic center. However, because raw samples are biologically secreted and rapidly polymerizable, enantiomeric separation has not yet been achieved. Functional assays nevertheless suggest preferential activity of one enantiomer, since NMDA current inhibition is not strictly proportional to total kayoynanite concentration.

Lipoproteic Chain and Polymerization: The principal originality of kayoynanite lies in its NH-R substituent, where R is an amphiphilic lipoproteic chain. This chain likely contains:

a) a hydrophobic lipid segment promoting membrane anchoring;

b) a peptide or glycopeptide segment enabling molecular recognition;

c) reactive groups permitting low-temperature cross-linking.

Upon exposure to cold air, these groups self-assemble into a hydrophobic polymeric network. This mechanism converts a soluble neuroactive monomer into a protective biomaterial, explaining the dual function of the secretion: NMDA modulation in monomeric form and cutaneous insulation in polymeric form.

Proposed Mechanism:

a) Monomeric kayoynanite diffuses into neural compartments and binds the intracanalar site of NMDA receptors.

b) It non-competitively blocks ion flux, particularly calcium entry, thereby reducing neuronal excitability and nociceptive transmission [1][6][7].

c) In parallel, exposure to cold triggers self-assembly and superficial cross-linking of the lipoproteic chain.

d) The resulting polymeric film limits heat loss and protects the epidermis from freezing.

e) Thus, the arylcyclohexylamine-like structure explains not only analgesia and contemplative states but also provides the hydrophobic, reactive core required for protective cutaneous matrix formation

Physical Properties and Cutaneous Polymerization

Upon contact with cold air, kayoynanite rapidly polymerizes, forming a transparent-to-opalescent hydrophobic film over exposed skin. The film reduces evaporative and convective heat loss and prevents superficial cutaneous freezing. Thermal measurements indicate that polymerized kayoynanite functions as a biological insulating layer. Its hydrophobicity limits water penetration, while its cohesive polymeric network maintains structural integrity at low temperature.

Neuro-Analgesic Activity

In NMDA-R+ cultures, kayoynanite produced dose-dependent inhibition of NMDA receptor-mediated currents. The compound reduced calcium influx, decreased channel-opening frequency, and suppressed action-potential propagation. These effects are consistent with the pharmacology of arylcyclohexylamines. Ketamine and related compounds act as non-competitive, open-channel NMDAR antagonists, reducing ion flux through the receptor pore and diminishing neuronal excitability [1][6][7].

In vivo, treated subjects showed:

a) Complete or near-complete analgesia.

b) Reduced withdrawal reflexes.

c) Prolonged immobility and contemplative states.

d) Preserved basic orientation at low doses.

e) Increased sensory dissociation at higher doses.

The behavioral profile suggests that kayoynanite acts primarily through NMDAR blockade, although additional monoaminergic, cholinergic, or opioidergic interactions cannot be excluded.

Endocrine Induction

Kayoynanite exposure activated the transcription factors GATA-4 and PAX-7. In Kayoynan subjects, this activation preceded accelerated pubertal development, including hormonal synchronization and somatic maturation. The endocrine response was observed after both oral and cutaneous micro-dose administration. Cutaneous exposure produced a slower but more sustained response, likely reflecting gradual release from the polymerized film.

Discussion

Kayoynanite is best understood as a tripartite xenobiomolecule: a neuroactive arylcyclohexylamine analog, a cold-activated cutaneous biomaterial, and an endocrine developmental inducer. Its NMDA-related activity provides a coherent explanation for analgesia and contemplative immobility. NMDA receptors are central to excitatory glutamatergic transmission, and their blockade reduces pain signaling and can produce dissociative or anesthetic states [1][4][6]. The polymerizing behavior, by contrast, likely represents an adaptation to extreme cold: the secretion simultaneously modulates pain perception and forms a physical barrier against thermal injury. The endocrine findings are more surprising. Activation of GATA-4 and PAX-7 implies that kayoynanite may act not merely as a passive secretion but as a signaling molecule capable of influencing developmental gene-regulatory networks. This raises the possibility that the Kayoynan phenotype is maintained through a feedback loop between environmental stress, secretion production, ritual exposure, and endocrine maturation. Within the Mnolahma Nelca framework, serial micro-dosing-oral or cutaneous-appears to serve three intertwined functions:

a) Identity transition: marking movement from childhood into an initiated social status.

b) Hormonal synchronization: coordinating pubertal development within a cohort.

c) Sensory modulation: inducing controlled analgesia, stillness, and altered perception during ritual practice.

From a comparative xenobiology perspective, kayoynanite illustrates how a single molecule may integrate protection, perception, and development. Its biomaterial behavior could inspire research into cold-adaptive coatings, while its NMDA activity may inform models of endogenous neuroprotective or analgesic compounds. However, the early endocrine effects also raise important safety concerns, particularly regarding chronic exposure, developmental timing, and potential long-term neuroendocrine disruption [8-10].

Limitations

This study is limited by the small number of sampled subjects, the absence of long-term longitudinal follow-up, and the difficulty of separating pharmacological effects from ritual expectation and environmental adaptation. Further work should include receptor-binding assays, enantiomeric separation, dose-response modeling, transcriptomic profiling, and comparative analysis with non-Kayoynan humano-murian secretions.

Conclusion

Kayoynanite is a structurally unusual lipoproteic secretion with an arylcyclohexylamine-like NMDA receptor activity, cold-induced polymerization, and endocrine-inducing properties. Its capacity to provide analgesia, thermal protection, and developmental signaling suggests an integrated adaptation to extreme environments. Beyond its cultural importance in Mnolahma Nelca practice, kayoynanite represents a promising model for research in neuropharmacology, adaptive biomaterials, and comparative endocrinology.

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Conflicts of Interest

The author declares no conflicts of interest.

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