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Investigating the Relationship Between Different Oxytocin Levels and Tendencies toward Criminal Aggression

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Introduction

Oxytocin, also known as the “love hormone,” is a nonapeptide secreted into the brain and blood by the paraventricular and supraoptic nuclei of the hypothalamus. Its primary target regions are the amygdala and hippocampus, both located in the brain. It is often recognized as a regulator of human social behaviors such as trust, generosity, and empathy; defined as the ability to share and understand the emotions and feelings of others [1].

However, oxytocin does not only facilitate positive social interactions; it may also contribute to negative ones. When an individual lacks or has an excess of oxytocin, they are more inclined to display psychopathic or manipulative behaviors [2]. Although oxytocin often promotes trust between individuals, this trust is frequently limited to those within the same group. As a result, it may raise in-group favoritism, ethnocentrism, bias, or even racial violence, which in turn can lead to antisocial behavior as well as misconduct.

Indonesia has been ranked fourth among Southeast Asian countries with the highest crime rates, reporting a crime index of 46.0 and a safety index of 54.0 [3]. These statistics bring urgency to investigate the biological and psychological aspects that may contribute to such criminal behavior or aggression. Although other factors such as one's environment, culture or socioeconomic status are recognized as the drivers of crime, it is important to note that neurobiological reasoning is as important, particularly oxytocin. By observing the oxytocin levels correlating to criminal violence, we could help offer a more holistic view as to why people participate in crime and misconduct. Additionally, acknowledging these connections may provide potential for the development of preventive measures or policy suggestions aimed at reducing crime rates in Indonesia and worldwide.

Therefore, this study aims to investigate the relationship between different oxytocin concentrations and criminal violence, with the objective of raising awareness regarding the neurobiological processes and factors that may lie under crime and antisocial behaviors.

Research Question

What is the relationship between different oxytocin concentration and the tendency to engage in criminal violence?

Literature Review

A study by Seda Yilmaz (2022) demonstrated that the oxytocin levels of people with schizophrenia, involved in crime, were significantly lower than other normal and controlled groups ($p < 0.001$). Additionally, the study showed that people who committed murder had significantly lower oxytocin levels than those who committed other crimes ($p < 0.05$) [4].

Likewise, in a study by Carsten K. W. De Dreu (2011), results were consistent and illustrated that oxytocin created inter-group bias and promoted in-group favoritism among the study groups. This motivated unfair treatment, triggering negative emotions and aggression towards disfavored groups, causing intense conflict [5].

Additionally, Ne'eman (2016) examined the effects of oxytocin on aggression through the Social Orientation Paradigm, essentially a monetary game that measures aggressive responses as

participants play against a fictitious partner. He found that the increase in oxytocin, possibly above the normal level, increased aggressive responses from naïve participants. These results suggest that oxytocin may promote violence and aggression in tense or social situations [6].

Joseph L. Alcorn (2015) investigated whether intranasal oxytocin affects the aggression level in healthy males through the Point Subtraction Aggression Paradigm. The results show that the increase in oxytocin heightens aggression in participants who already had antisocial traits [7].

However, in a study by Yücel R. Berends (2019), he similarly examined the effects of intranasal oxytocin in healthy males using the Point Subtraction Aggression Paradigm. As a result, the study found that increased oxytocin levels significantly lower aggressive response and behavior compared to placebo [8].

Proposed Methodology

This study will involve participants having their oxytocin levels measured through blood samples and their aggression will be assessed through surveys and questionnaires.

Subjects

Participants (n=150) will be equally divided into two main groups. The first group of people (n=75) will be the experimental group, consisting of individuals with a record history of criminal aggression or engagement in violent crimes. They will be recruited from local correctional institutions with rehabilitation and treatment programs. The second group (n=75) is the control group and consists of individuals with no documented criminal record, selected from the general public through advertisements.

All participants recruited will be within the range of 18 to 25 years old. Both male and female are able to participate, but the gender differences in oxytocin levels will be taken into account. Additionally, those excluded will include individuals who have psychological disorders such as schizophrenia or bipolar disorders, current drug or alcohol addictions, or are currently under medication that may influence hormone levels. Prior to the investigation, all participants will have to complete a consent form. They will be guaranteed anonymity and the ability to withdraw from the experiment at any time.

Experimental Procedures and Materials

Research Design

This study will be carried out through a quasi-experimental design to observe the relationship between natural oxytocin concentrations and violent behaviors. As we compare and analyze the oxytocin levels among the two groups of participants, the study aims to establish whether lower or higher levels of oxytocin in the body is associated or correlates with the rate of aggression and violence.

Screening

To start, participants will have to fill in a structured health screening form to confirm their eligibility to participate in the experiment. Official criminal records will be examined through legal documents and criminal databases. Additionally, to verify their alcohol background, a urine

test will be administered. Participants will have to abstain from alcohol, caffeine or any kind of drugs for 48 hours and 24 hours before the testing.

Biological Sampling and Analysis

The plasma oxytocin concentrations will be measured using a standardized enzyme-linked immunosorbent assay (ELISA) kit. Blood samples (7 ml) are gathered between 9:00-11:00 AM to minimize any potential variation in oxytocin levels throughout the day and immediately stored on ice and then frozen at -70°C until analysis where they will be rehydrated and run on the ELISA plate.

Aggression Assessment

The aggression level of participants will be assessed using two methods:

1. The Buss-Perry Aggression Questionnaire (BPAQ): a 29-question self-report scale that measures physical and verbal aggression, anger and hostility in adults (5-8+).
2. The Taylor Aggression Paradigm (TAP): participants will compete on a computer-based reaction time task against a fictitious opponent. The participant is able to set a level of simulated electric shock to punish the fictitious opponent whenever they lose and the intensity and duration of these shocks act as the index for aggressive behavior.

Data Analysis

All data analysis will be performed using IBM SPSS Statistics (Version 29.0).

Ethical Considerations

This study will strictly adhere to ethical research guidelines. All participants will be provided with a consent form that will entail detailed information regarding the study's aims, procedures and such ethical guidelines. They will be guaranteed anonymity and confidentiality, along with the right to withdraw from the study at any time. Moreover, all participants will be debriefed regarding the results of the investigation and we will maintain transparency between researchers and the participants. Lastly, biological samples will be gathered following medical safety protocols and offenders will be ensured to not be pressured by authorities to participate in this study.

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