

*SEROTONIN PROFILE OF KINTAMANI DOGS IN THE BEHAVIOR OF GUNA, JAYA, PAKSA, TEK, KYUL (LOCAL BELIEFS) OF THE BALINESE COMMUNITY*

**(Profil Serotonin Anjing Kintamani pada Perilaku *Guna, Jaya, Paksa, Tek, Kyul* (Keyakinan Lokal) Masyarakat Bali)**

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**Abstract**

There is a belief in Bali which is the local wisdom of the Balinese people that the behavior of dogs is divided into *guna, jaya, paksa, tek* and *kyul*. *Guna* is a dog with an obedient behavior, useful and suitable as a hunting dog. *Jaya* is a dog with an attractive behavior, energetic, tends to be hyperactive. This type of dog is also good for hunting and *paksa* is a dog that is difficult to manage. This dog is suitable for house keeping. *Tek* is a dog with dirty behavior and is difficult to train or manage and *kyul* is a dog with a lazy behavior. The results showed that the behavior or nature of dogs is related to serotonin compounds in the blood. Aggressive dogs such as *jaya* and *paksa* have a low serotonin level profile. The purpose of this study was to determine the serotonin profile of different behavior according to the beliefs of the Balinese people towards Kintamani dogs. A total of 30 Kintamani dogs were used as experimental animals. The research design used a cross-sectional study design. The ELISA method was used in this study to determine serotonin levels in the blood. The results of the serotonin profile showed that the dogs with the characteristics of *guna, jaya, paksa, tek* and *kyul* were  $114.4 \pm 24.51$ ;  $98.5 \pm 28.47$ ;  $269.9 \pm 87.8$ ;  $316.6 \pm 54.8$  and  $256 \pm 15.1$  (mmol/dl). It was concluded that the profile of the Kintamani dog has normal serotonin levels.

Keywords: behavior; serotonin; dog

**Abstrak**

Terdapat kepercayaan di Bali yang merupakan kearifan lokal masyarakat Bali bahwa karakter anjing dibedakan menjadi *guna, jaya, paksa, tek* dan *kyul*. *Guna* adalah anjing dengan perilaku penurut, berguna dan cocok digunakan sebagai anjing pemburu. *Jaya* adalah anjing perilaku atraktif, energik, cenderung hiperaktif, anjing jenis ini juga baik untuk berburu dan *paksa* adalah anjing yang sulit diatur, anjing ini cocok untuk penjaga rumah. *Tek* adalah anjing berperilaku kotor dan sulit dilatih ataupun diatur serta *kyul* adalah anjing perilaku pemalas. Hasil penelitian menunjukkan bahwa perilaku atau sifat pada anjing berkaitan dengan senyawa serotonin dalam darah. Anjing yang galak (agresif) seperti pada *jaya* dan *paksa* mempunyai profil kadar serotonin yang rendah. Tujuan penelitian ini untuk mengetahui profil serotonin pada karakter yang berbeda menurut kepercayaan masyarakat Bali terhadap anjing kintamani. Sebanyak 30 ekor anjing kintamani digunakan sebagai hewan coba. Rancangan penelitian

menggunakan rancangan *crosssecional study*. Metoda elisa digunakan dalam penelitian ini untuk mengetahui kadar serotonin dalam darah. Hasil profil serotonin menunjukkan bahwa anjing perilaku *guna, jaya, paksa, tek* dan *kyul* berturut-turut adalah  $114,4 \pm 24,51$ ;  $98,5 \pm 28,47$ ;  $269,9 \pm 87,8$ ;  $316,6 \pm 54,8$  dan  $256 \pm 15,1$  (mmol/dl). Disimpulkan bahwa profil anjing kintamani menurut kepercayaan lokal masyarakat Bali mempunyai kadar serotonin yang normal.

Kata kunci: perilaku; serotonin; anjing

## INTRODUCTION

Serotonin compounds are neurotransmitter compounds, namely compounds that function to transmit impulses from one neuron to the next neuron (Frazer and Hensler, 1999). Serotonin is formed in serotonergic neurons in the central nervous system. This compound is also found in enterochromaffin cells in the digestive tract (Jensen, 2007). Several studies have been conducted on the relationship between serotonin levels and dog character. The results of the studies that have been conducted show that serotonin is involved in behavioral responses such as aggression and feelings. Aggressive dogs show low blood levels of serotonin (Amat *et al.*, 2013; Alberghina *et al.*, 2016). Animals such as dogs that have a low profile of serotonin can cause mood disorders, such as anxiety, depression and their turn becomes aggressive, obsessive-compulsive disorder, phobias, stress, and can cause epilepsy. Dogs can suffer from emotional problems such as anxiety, fear and anger, so dogs can suffer from behavioral changes such as depression, stress-related disorders, irrational fears and obsessive compulsive disorder. Emotional feelings such as anxiety, fear and anger are closely related to blood serotonin.

Several factors can affect serotonin levels in a dog's blood such as race (Höglund *et al.* 2018), food in this case tryptophan (Andrea *et al.*, 2015; Riggio *et al.*, 2021), body size (Siswanto *et al.*, 2023).

Serotonin has been involved in almost all types of behavior, such as appetite, emotional, motor, cognitive and autonomic. However, from a physiological perspective,

it is unclear whether serotonin affects behavior specifically or more generally by coordinating the activity of the nervous system, especially to regulate activity situations in relation to arousal. The main piece of data that has contributed to the view that serotonin has a general effect on behavior by modulating nervous system activity comes from studies of the level of serotonergic activity in the soma raphe nuclei in the brain (Frazer, 1999).

However, exposing a stressed cat to environmental situations, such as loud noises or the sight of a dog, while producing strong sympathetic activation and a characteristic behavioral response, did not change the firing rate of serotonergic neurons. Thus, the type of motor activity that activates the serotonergic soma appears to be repetitive. Furthermore, activation of serotonergic transmission inhibits information processing in the afferent nervous system. From all these data, it was concluded that the serotonergic nervous system influences behavior (Frazer and Hensler, 1999). Mann (2013) from the results of his study argues that the serotonin system is involved in both diathesis (decision making) and major depression. It is clear that serotonin has to do with feelings as well as in deciding a problem.

With regard to the behavior or character of dogs, the Balinese believe in ancestral culture that has existed for a long time from generation to generation as local wisdom and it is recorded in lontar that dogs have five categories of behavior (Asu, 2017). The five behaviors are arranged sequentially from number one to number five. This behavior is written on Lontar Siksian Wawalungan, Griya Pada, Kerambitan, in the order *guna, jaya, paksa,*

*tek* and *kyul*. *Guna* is a dog that has good character, obedient useful and suitable as a hunting dog. *Guna* is interpreted as a dog with good character, so it is very useful for the owner. *Jaya* means that this dog is good, energetic and even tends to be hyperactive, so it needs special handling to be used as a hunting dog. *Jaya* is a dog that has good character for hunting. *Paksa* is a dog that has a lazy character, so it takes coercion to chase or order this dog. This type of dog is not suitable to be used as a hunting dog and is only suitable for guarding the house. This *tek* dog is suitable for hunting use, but has a short life. Meanwhile, other sources state that *tek* is a dog that has the behavior of going to people who are having celebrations (in the local language it is called *odalan*) (Dharmawan, 2009). According to the local community, this type of dog will come when they hear the sound of *tek* (the sound of people chopping meat and spices) through their senses of hearing and smell. Furthermore, *Kyul's* behavior describes a dog that has a lazy character, only likes to eat and sleep, so it is not good to be used as a hunting dog.

If the behavior according to the belief of the Balinese people is related to aggressiveness, a dog that behaves triumphantly and forcefully is a dog that is most likely to have a low (aggressive) serotonin profile.

## RESEARCH METHODS

### Research design

The research design used a cross-sectional study design and the results are presented in descriptive. Sampling was carried out using a purposive system (non-random or determined sampling).

### Sample

Thirty dogs were used in this study, all dogs were observed for clinical symptoms and were physically healthy, and were not currently undergoing therapy. The dogs come from Sukawana village, Kintamani sub-district, Bangli district, Bali.

Approximately 3 ml of blood samples were taken from the jugular vein from 30 dogs inserted into a blood collecting tube (blood collecting tube) anticoagulated EDTA. It is put in a cooling box and taken to the laboratory to determine the level of lactic acid (indirect ELISA). MyBioSource Southern California, San Diego, USA serotonin kit was used in this study.

### Data analysis

Analysis of variance was used to assess serotonin levels (Steel and Torrie, 1981). P value < 0.05 was considered significant for all analyses. Data were analyzed using SPSS software.

## RESULTS AND DISCUSSION

### Results

The results of the ELISA test on serotonin levels from 30 blood samples are *guna*: 114,4±24,51, *jaya* 98,5±28,47, *paksa* 269,9±87,8, *tek* 316,6±54,8 and *kyul* 256±15,1 (mmol/dl). Hasil data dan uji statistik dipaparkan di Tabel 1 dibawah ini.

### Discussion

Serotonin as a serotogenic compound comes from food consumed, namely tryptophan. Serotonin is formed when the amino acid L-tryptophan is broken down in the liver by the enzyme tryptophan hydroxylase. This breakdown process produces 5-hydroxytryptophan (5-HTP), which is a direct precursor of serotonin. Serotonin travels through the bloodstream, crosses the blood-brain barrier, and enters brain tissue. Once in the brain, 5-HTP is converted into 5-hydroxytryptamine (5-HT), better known as serotonin. The serotonin that is formed is then stored in the nerves. When serotonin levels are balanced, you feel calm, sleep better and stress less. The decreased effect of serotonin causes depressive or apathetic moods, restless thoughts and insomnia/sleep disturbances. The effect of serotonin on sleep is primarily related to the hormone melatonin. Melatonin is the main hormone responsible for maintaining proper circadian rhythms (sleep/wake cycles) in the body. Serotonin

in the brain is converted to melatonin because the body needs it (Frazer and Hensler, 1999; McKee and McKee, 2003).

In its function as a neurotransmitter compound, serotonin which is used in the brain as a neurotransmitter must be produced in the brain, because this compound cannot cross the blood-brain barrier. The existence of stimulation in the neuron will cause serotonin in the bag at the end of the axon in the synapse, to come out and deliver the stimulus to the next neuron (Frazer and Hensler, 1999).

Balinese people traditionally believe that the character of dogs can be grouped into five, namely *guna*, *jaya*, *forced*, *tek* and *kyul*. These five characters are seen from their aggressive nature (aggressiveness) have different levels of aggressiveness. Aggressiveness test can be known by knowing levels of serotonin in the blood. The results of previous studies show that serotonin levels in the blood are related to the character/aggressiveness of dogs (Alberghina *et al.*, 2019; Diana *et al.*, 2020; Bacqué-Cazenave *et al.*, 2020; Riggio *et al.*, 2021).

The results showed that the *jaya* character had the lowest serotonin levels and was statistically significantly different from the *paksa* dog, *tek* and *kyul* characters. A dog with a winning character shows that the dog has an aggressive character. Apart from being a good dog, the *guna* dog has relatively low serotonin levels and is quite an aggressive dog, but statistically not much different from the winning dog. Furthermore, the enforced dog characters, *tek* and *kyul*, all three had high serotonin levels and there was no statistically significant difference between the three. The dogs are not aggressive.

## CONCLUSION AND SUGGESTION

### Conclusion

Testing serotonin levels can help determine the aggressiveness of dog behavior based on local Balinese beliefs. Successful behavior shows the lowest serotonin profile and dogs with this

serotonin profile show more energetic and aggressive behavior. Then followed by the dogs behaving *guna*, *force*, *tek* and *kyul*.

### Suggestion

It is known that the serotonin profile in Kintamani dogs is known, therefore it would be good if studies and research were carried out on serotonin in other animals in Bali.

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Tabel 1. Serotonin levels in Kintamani dog's behavior of *guna, jaya, paksa, tek, and kyul*

Variable	<i>Guna</i>	<i>Jaya</i>	<i>Paksa</i>	<i>Tek</i>	<i>Kyul</i>
Level serotonin	114,4 <sup>a</sup>	98,5 <sup>a</sup>	269,9 <sup>b</sup>	316,6 <sup>b</sup>	256 <sup>b</sup>
SD	±24,51	±28,47	±87,8	±54,8	±15,1

Description: different superscript letters in the same row, indicating significance (P<0.05).