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Investigation of Serum Beta-Endorphin Levels in Cows Slaughtered with Halal Slaughter Method *

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Beta-endorphin is one of the important members of the body-produced (endogenous) opioid peptides. Because of its pain relieving properties, it is regarded as an answer of the organism to stress. In this study, clinically healthy and nonpregnant 6 brown swiss hybrid cows at the aged 3-5 years of age, brought to the slaughterhouse which belongs to same company, were used. Blood samples were collected into anticoagulant free tubes from vena jugularis 20 minutes before the slaughter (Group 1); from flowing blood during bleeding (Group 2); from flowing blood, 3 minutes after slaughter (Group 3). Blood serum beta-endorphin levels were determined using beta-endorphin ELISA kit. Serum beta-endorphin levels for groups 1, 2 and 3 were determined as 157.0±23.1, 262.0±35.8, 574.3±95.4 pg/mL, respectively. There was significant differences in the serum beta-endorphin levels before, during and after slaughter. As a result, it has been revealed that halal slaughter provides relief in animals instead of pain through a beta-endorphin reaction.

Key Words: *Beta-endorphin, halal slaughter, cow*

Helal Kesim Uygulanan İneklerde Serum Beta-Endorfin Seviyelerinin İncelenmesi

Beta-endorfin, vücut tarafından üretilen (endojen) opioid peptidlerin önemli üyelerinden biridir. Ağrı giderici özellikleri nedeniyle, organizmanın strese bir cevabı olarak kabul edilir. Bu çalışmada, klinik açıdan sağlıklı ve gebe olmayan, aynı işletmeye ait, günlük kesim için kesimhaneye getirilen, 3-5 yaşlarında 6 montafon hibridi inek kullanıldı. Kan örnekleri, kesimden 20 dakika önce vena jugularis'ten antikoagülan içermeyen tüplere (Grup 1); kesim esnasında akan kandan (Grup 2); kesimden 3 dak. sonra baş bölgesinden akan kandan (Grup 3) alındı. Kan serumu beta-endorfin seviyeleri beta-endorfin ELISA kiti kullanılarak belirlendi. Grup 1, 2 ve 3 için serum beta-endorfin düzeyleri sırasıyla 157.0±23.1, 262.0±35.8, 574.3±95.4 pg/mL olarak belirlendi. Serum beta-endorfin seviyelerinde kesim öncesi, esnası ve sonrasında anlamlı farklılıklar gözlendi. Sonuç olarak, helal kesimin hayvanlarda acıdan ziyade beta-endorfin reaksiyonuyla rahatlama sağladığı ortaya konulmuştur.

Anahtar Kelimeler*: Beta-endorfin, helal kesim, inek*

Introduction

In the last decade, in animal slaughtered for human consumption, methods such as impact gun, brain concussion, electro narcosis and carbon dioxide exposure, which are known as modern slaughter methods in the West, and also halal slaughtering, which is a traditional slaughter method described by Islam, are applied (1, 2).

The concept of halal slaughtering includes the following elements: Bleeding starts with the name of God, using a sharp blade for cutting, cutting of at least one of the main vessels and *Vascular Jugularis and Arteria Carotis Communis*, and exhaustion of blood from the body. In this method, no stunning is performed on live animal before cutting and direct-cutting is applied (2).

Beta-endorphin hormone is one of the important members of the body-produced (endogenous) opioid peptides. It is evaluated as an answer to the stress by it's painkiller feature (3-7). Beta-endorphin interacts with the hormonal system and other systems to perform modulator functions (6, 7).

Beta-endorphin acts as a central pain-killer, with pain relief up to 20-33 times greater than morphine; gravimetric strength is about 50 times higher than morphine (6, 7). Beta-endorphin is synthesized from a macro peptide containing 285 amino acids, proopiomelanocortin, especially in the brain and spinal fluid cells. Beta-endorphin is secreted along with ACTH from cells in the anterior pituitary (8, 9).

Beta-endorphin is also considered as a physiological parameter in determining animal welfare, which expresses the physical and mental health and well-being of animals in adverse environmental or management systems due to their ability to reduce pain (10, 11). In spite of all these, there are very few studies on animal slaughter - pain relations in the literature.

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In a study of beta-endorphin levels as stress indicator, the reseacrchers found no statistically significant difference in beta-endorphin levels before and after cutting with the stunning method (10). In another study, it was investigated the sustained beta-endorphin levels in animals in a study using a gun-stunning method in the horse; they did not find any significant difference in beta-endorphin levels before and after slaughtering (12).

In this study, it was aimed to determine the changes of beta-endorphin levels secreted by the body as a response to the stress and before, during and after the halal slaughter that the findings are aimed at shedding light on the debate on slaughtering methods.

Material and Methods

Animals: In the study, clinically healthy and nonpregnant 6 brown swiss hybrid cows were used at 3-5 years of age. The samples were collected from the animals from the same farm and brought to the slaughterhouse for slaughter.

Blood Samples: Blood samples were taken 20 min before cutting from the jugular vein (Group 1), during slaughter, from the flowing blood (Group 2) and 3 min after slaughter from flowing blood of head, 3 minutes after slaughter (Group 3) to anticoagulant free tubes in 10 ml volume. Blood samples were centrifuged at room temperature for 5 minutes at 3000 rpm and stored at -20 ° C until tested.

Beta-endorphin Analysis: The commercial ELISA kit (CSB-E13051B, Cusabio, MD, USA) was used to measure blood serum Beta-endorphin values. The manufacturer's standard values were used to calculate serum beta-endorphin levels from the optical density (OD) values obtained from the ELISA assay (46.88 pg/mL to 3000 pg/mL).

Statistical Aanalysis: All results are expressed as mean ± standard deviation (SD). Statistical significance was determined using ANOVA with Bonferroni test as post-hoc calculation. A “P” value of less than 0.05 was considered statistically significant.

The procedure was approved by Harran University, Local Ethics Committee for Animal Experiment (23/10/2017 - 2017/006-01-10).

Results

Blood beta-endorphin levels measured 20 min before, during and 3 min after slaughter are shown in Figure 1. In comparison of all experimental groups, differences in beta-endorphin levels between groups were found statistically significant (P<0.001). Beta-endorphin levels in blood serum samples taken 20 min before slaughter were determined as 157.0±23.1 pg/mL (Group 1). Beta-endorphin level in the blood samples taken during slaughter (262.0±35.8 pg/mL, Group 2) was found to be higher than pre-slaughter values. Beta-endorphin level in the group that blood samples taken 3 min after slaughter (574.3±95.4 pg/mL, Group 3) was found to be significantly higher than both the groups that blood samples taken 20 min before (P<0.05) and during slaughter (P<0.05).

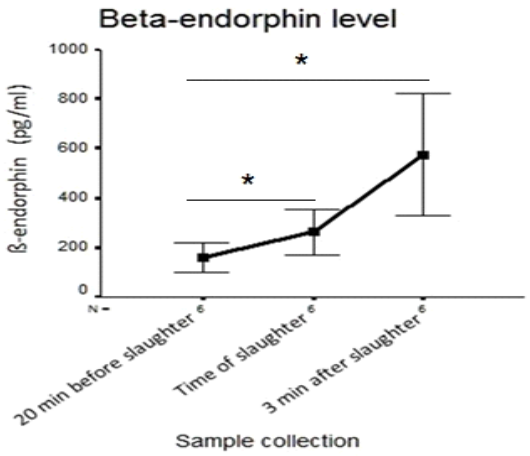

Figure 1. Beta-endorphin levels before, time and after slaughtering in cows with halal slaughtering method.

Discussion

In the study, the relation between beta-endorphin levels and halal slaughter method applied in animals was investigated. The beta-endorphin values obtained before slaughter in healthy cows (157.0±23.1 pg/mL) are consistent with the beta endorphin values of different sources reported in the literature (12-14).

Although there are many studies on animal-pain association in various cutting methods, only a few studies on beta-endorphin, which is a potent painkiller. In a study (10) on pre-slaughter and post-slaughter beta endorphin levels in calves, the researchers reported no significant difference between beta-endorphin levels. In our study, beta endorphin levels increased during bleeding (Group 2) compared to before bleeding (Group 1) and 3 min after slaughter (Group 3) showed a statistically significant increase in (Figure 1). In terms of the change in beta-endorphin levels, the difference between our study and this study may depend on the cutting methods. We think that stunning methods applied in the European Union (EU) may have triggered in low level of beta-endorphin induction in animals and therefore beta-endorphin release was at a low level after slaughter.

In a study (12) conducted by horse-knocking methods in the horses, beta-endorphin levels were examined in animals before and after slaughter. They did not find any significant difference in beta-endorphin levels before and after slaughtering. As a matter of fact, we think that this may be related to the destruction of the brain through weapon or electroshock applications before cutting. On the halal side, we think of the increase in beta-endorphin level in all animals after and during slaughter, as a sign that this hormone released regularly by the brain after slaughter.

Generally in livestock slaughter; halal slaughter method is applied in Turkey, where as stunning percussion pistol, concussion, electronarcosis, or exposing to carbon dioxide methods are applied in the

EU countries. With the entry of Turkey's to EU membership, according to the EU acquis, it is necessary to comply with the EU slaughter method. This situation will be an important trouble for Turkey, as a country that majority is Muslim population. This situation is also causing serious problems for the Muslim population living in EU countries. While it is claimed by the EU that halal slaughter is not suitable for animal welfare and that animals suffer from pain, our study proved with molecular biological method that halal slaughter is the most appropriate method for animal welfare with minimal pain. For the first time with our work, we are presenting scientific proof against unjustified accusations about halal slaughter by EU due to the lack of incomplete data.

As a conclusion, halal slaughter provides animals are relieved relief through beta-endorphin reaction rather than pain. Halal slaughter contributes to animal welfare in terms of less suffering.

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