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Effect of subclinical mastitis on milk taurine concentration in dairy cows

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ABSTRACT

The objective of this study was to evaluate whether taurine has any role in bovine subclinical mastitis, and the relationship between milk taurine concentration and somatic cell count. Forty milk samples from dairy cows aged 3 to 6 during lactation were used for this research. The California Mastitis Test (CMT) and somatic cell counts (SCC) were determined in the diagnosis of subclinical mastitis. The subclinical mastitis group consisted of 20 milk specimens positive for CMT and SCC>200.000/ml of milk. The control group consisted of 20 milk specimens negative for CMT and SCC<200.000/ml of milk. A bovine-specific taurine enzyme-linked immunosorbent assay kit was used to determine the taurine concentration in the milk. The milk serum taurine concentrations were determined as 232.1±89.8 pg/ml in the control group and 158.0±55.6 pg/ml in the subclinical mastitis group. These results determined that the taurine concentration in milk with subclinical mastitis decreased approximately 1.5 times compared to healthy milk ($P<0.05$). A significant negative correlation was determined between the taurine concentration in cow's milk with subclinical mastitis and the number of somatic cells ($r= -0.933$; $P<0.001$). From the findings of this study, it was concluded that both somatic cell counts and the measurement of taurine in cow's milk could be used to monitor mammary health.

Key words: cow; milk; subclinical mastitis; taurine

Introduction

Subclinical mastitis consists of all the reactions of the mammary tissue against various irritant factors such as inflammation, infection, and oxidative stress in lactating animals (PYÖRÄLÄ, 2003; WU et al., 2007; SILANIKOVE et al., 2014; MAVROGIANNI et al., 2017; TURK et al., 2017). Isolation of mastitis pathogens is very important in the systematic control of mammary gland health in dairy cattle (CVETNIĆ et al., 2016; 2022). It is emphasized that continuous monitoring of staphylococci, which is an important cause of mastitis in humans, cattle, and other domestic animals in dairy farms and businesses, is important as a precaution against the spread of the zoonotic pathogen (CVETNIĆ et al., 2021). Subclinical mastitis causes morpho-pathological changes in

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the mammary gland, and physical, chemical, and bacteriological changes in milk (RADOSTITS et al., 2000; GUHA et al., 2012). Somatic cell count is an important criterion in the diagnosis of mastitis and, depending on the increase in the number of somatic cells in milk, the content of milk varies compared to a healthy cow's milk (KNEŽEVIĆ et al., 2021). Subclinical mastitis, one of the important diseases of the mammary gland, affects milk production and mammary tissue, and causes significant economic losses (HAMADANI et al., 2013; SARKER et al., 2013; MARTINS et al., 2020; FERNANDES et al., 2021). Subclinical mastitis has also been reported to have negative effects on reproductive performance in dairy cows during the lactation period (HERTL et al., 2010; NAVA-TRUJILLO et al., 2010). Subclinical mastitis remains a major problem for the dairy industry worldwide (OWENS et al., 1997; TESFAYE et al., 2010; ALEKISH et al., 2017; MPATSWENUMUGABO et al., 2017; LAMARI et al., 2021).

Molecular studies for determining mastitis while it is in the subclinical phase are essential in preventing the disease's progression to its clinical form, both in terms of the cow's health, and milk quality and yield. Protein components specific to the inflamed tissue in the milk of the infected mammary gland are used as diagnostic biomarkers for mastitis (BENIĆ et al., 2018). In a study evaluating the proteomics of inflammatory and oxidative stress response in cows with subclinical mastitis, it was stated that Serpin A3-1 and vitronectin were up-regulated, complement factor H was down-regulated, and vitronectin might be a possible marker for subclinical mastitis (TURK et al., 2012). The oxidative stress and inflammatory reaction induced by subclinical mastitis have been reported to significantly reduce paraoxonase-1 activity in the blood and milk of affected cows (NEDIĆ et al., 2019). It has been suggested that paraoxonase-1 can be considered a potential biomarker for the diagnosis of the subclinical form of mastitis (KOVAČIĆ et al., 2019).

Taurine (2-aminoethanesulfonic acid) is an intracellular β-amino acid found in animal tissues and the milk of many species. One of the most prevalent amino acids in the body, taurine, makes up about 0.1 percent of body weight (UEKI and STIPANUK, 2007; MURAKAMI, 2015). While taurine is commonly found in animal foods, it is not in plant foods. Taurine biosynthesis varies according to tissue type and species, and although it is mainly synthesized in brain tissue and the liver, it is also synthesized in the mammary glands, placenta, lungs, kidneys, and adipose tissue (SHIMADA et al., 1998; HU et al., 2000a; HIRSCHBERGER et al., 2001; IDE et al., 2002; STIPANUK et al., 2002; 2004; De LUCA et al., 2015). While taurine has a high concentration at birth, it decreases during the aging process (STURMAN et al., 1977). Taurine, which is abundant in skeletal muscle, is an important factor for skeletal muscle development and growth, and taurine deficiency causes incomplete muscle development (MIYAZAKI et al., 2013). Deficiency of taurine both in fetal life and during breastfeeding causes fetal and postnatal growth retardation (EJIRI et al., 1987; HU et al., 2000b).

Reports on milk taurine levels are quite limited. The amount of taurine in cow's, sheep, and buffalo milk has been reported to be 0.60 mg/100 g, 6.55 mg/100 g, and 7.32 mg/100 g, respectively (MANZI and PIZZOFERRATO, 2013). In pig's milk, taurine is the most prevalent free amino acid (1238 μmol/l) (SARWAR et al., 1998). Cysteine dioxygenase is expressed in the mammary duct epithelial cells and stromal adipocytes of the mammary gland of rats, and the taurine concentration in rat milk is highest in colostrum (approximately 500 μmol/l) and gradually decreases throughout lactation (below 200 μmol/l) (UEKI and STIPANUK, 2007). It has been reported that the concentration of taurine in colostrum in rats is approximately 200 μmol/dl, and it gradually declines to a plateau (below 100 μmol/dl) after the 5th day of lactation (HU et al., 2000a).

The concentration of taurine in milk, which has nutritional requirements for humans and animals, is very important for health because taurine is linked to membrane stabilization, cell development, cell signaling, cellular osmoregulation, calcium homeostasis, retinal and cardiac function, antioxidative activity, detoxification, neuroprotection, neuromodulation, and brain development (REDMOND et al., 1998;

SCHAFFER et al., 2002; BOUCKENOOGHE et al., 2006; COLLIN et al., 2006; SCHAFFER et al., 2010; TOCHITANI, 2017; WU et al., 2022; WANG et al., 2022). To understand the pathophysiology of mammary gland diseases and to develop treatment strategies, the mechanisms of destruction in the mammary tissue should be well known. Although it is known that the cysteine dioxygenase enzyme is present and is involved in the synthesis of taurine in the mammary duct epithelial cells, and stromal adipocytes in the mammary gland, it is not known whether it has a role in subclinical mastitis, which is thought to be an inflammatory process. As far as we know, the relationship between somatic cell counts and milk taurine concentration has not yet been investigated in detail. Therefore, the present study was undertaken to examine the effect of subclinical mastitis on milk taurine concentration in cows. The objective of the present study was to reveal whether taurine has any role in subclinical mastitis, and the relationship between somatic cell count and taurine levels used in laboratory confirmation of subclinical mastitis.

Materials and methods

Animal material and sampling. The study was carried out on lactating Jersey cows aged 3-6 years, with no history of clinical mastitis within the preceding month, from one dairy herd in the Samsun province in 2017-2018. The cows were fed a total mixed ration composed of corn silage, grain concentrate, and minerals. Water was available *ad libitum*. The cows were milked twice a day by milking machines. The studied cows had a milk production range of 12-18 kg per cow per day. The mean somatic cell count in milk from the tested herd was followed for at least three consecutive months. The CMT and milk somatic cell count were used to diagnose subclinical mastitis. Cows were defined as having subclinical mastitis on the basis of at least 2 out of 3 weekly SCC results $>200\times10^3$ cells/ml, measured in composite milk samples collected weekly. Cows with an SCC greater than 200×10^3 cells/ml in their milk from all four udder lobes constituted the study subclinical mastitis group. Cows with SCC less than 200×10^3 cells/ml in the milk from all four udder lobes formed the control group of the study. Milk samples were collected from four separate udder lobes of each cow into 10 ml glass tubes for somatic cell counting, and 20 ml plastic vials for the enzyme-linked immunosorbent analysis (ELISA). Milk samples were kept refrigerated (4-8°C) until they were transported to the laboratory for milk taurine and SCC analysis.

California mastitis test (CMT). The milk samples were expressed from each quarter of the cow in 4 separate compartments into the CMT test cup, the amount of milk in each compartment was equalized, and the CMT solution was added at a ratio of 1:1. Color and consistency changes were observed by rotating the CMT test cup with circular movements. +1, +2, and +3 evaluations were made according to the consistency and color of the gel formed. Mixture in which there was no change were evaluated as negative (SCHALM et al., 1971).

Somatic cell count. Somatic cell count (SCC) in milk samples was carried out by the method reported by KILICOGLU et al. (1989). For this purpose, 10 ml milk samples taken into glass tubes were centrifuged at 1550 g for 10 minutes, the milk cream collected at the top of the tube was poured by heating the end of the tube, and the tubes were placed in the port tube and inverted for 20 minutes. The 0.01 ml of sediment collected at the bottom was spread over 1 square cm. The milk smear was dipped in 0.2% toluidine blue dye until stained, and dried. Somatic cell counting was performed with light microscopy (Nikon Eclipse E600, Nikon Instruments Inc., Tokyo, Japan), with an oil-immersion lens of 100 X magnification and 10 X eyepiece(s). At least 15-20 different fields were counted on the milk smear specimen. The average cell number was calculated by dividing the total number of cells by the number of fields (Table 1).

Preparation of milk serums. Milk samples were collected separately from four different udder lobes of each cow into 20 ml plastic vials. The method reported by ALAIS (1984) was applied for preparation of the milk serums. For this purpose, 1 ml of 0.3% chymosin was added to the milk samples and kept in a 37°C water bath for 20 minutes. To extract the optimum level of milk serum, the tubes were kept at room temperature for 80 minutes and carefully divided between the clot and the tube.

Table 1. Evaluation of somatic cell count

Mean cell number	Score	Cell number per ml
1-5	+	<200.000
6-20	++	>200.000
>20	+++	>1.000.000

After the upper milk serum was filtered with the help of filter paper, it was centrifuged at 1550 g for 5 minutes. The cream layer on the upper part of the tubes was discarded, and the milk serum was collected into microcentrifuge tubes.

Measurement of taurine concentration in milk serums. The ELISA method was used to measure taurine concentration in milk serums. For this purpose, the procedure reported by the manufacturer (Sunred Biological Technology, Shanghai, China) was followed using the bovine taurine ELISA test kit. 50 µl of standard and 50 µl of streptavidin were added to the standard wells. 40 µl of milk serum, 10 µl of taurine-antibody, and 50 µl of streptavidin were added to all test wells. The microplate was covered with a membrane and gently shaken, then incubated for one hour at 37ºC. The wash solution was diluted 30 times with distilled water. After one hour, the membrane on the microplate was carefully removed, and all wells were washed five times with the washing solution. 50 µl of chromogen solution A and 50 µl of chromogen solution B were added to all wells. The microplate was covered with a membrane again, and after shaking gently, it was left to incubate at 37ºC for 10 minutes. At the end of the incubation, 50 µl of stop solution was pipetted into all wells. Within 15 minutes after the completion of the ELISA steps, the absorbance of the wells was read in the microplate reader (Tecan Infinite F50, Austria) at a wavelength of 450 nm. Milk serum taurine concentrations were calculated using the standard curve. Results were presented as pg/ml.

Statistical analysis. The SPSS 22.0 package program was used for statistical analysis of the data obtained in the study. Before significance testing, all data were assessed with Shapiro-Wilk for normality, one of the parametric test assumptions. The data were found to have a non-normal distribution. When comparing the groups statistically, non-parametric variables were subjected to the Mann-Whitney *U* test. A minimum P-value of <0.05 was considered significant for statistical findings.

Results

CMT scores and SCC in milk samples. The findings of the CMT and SCC in the control group are shown in Table 2. The findings of the CMT and SCC in the subclinical mastitis group are shown in Table 3.

Somatic cell counts in milk samples. The milk somatic cell counts of the control and subclinical mastitis groups are presented in Table 4. It was determined that the milk somatic cell count of the control group was 1.85±0.81 x 10^5 cells/ml, and the milk somatic cell count of the subclinical mastitis group was 4.55±1.23 x 10^5 cells/ml.

Taurine concentrations in milk. Milk taurine concentrations of the control group and subclinical mastitis group are presented in Fig. 1. In the control group of milk taurine concentration, it was determined that the lowest was 49.3 pg/ml and the highest was 357.2 pg/ml, and the mean±standard deviation value was 232.1±89.8 pg/ml. The lowest taurine concentration in the milk of the subclinical mastitis group was 52.7 pg/ml and the highest was 259.7 pg/ml, and the mean ± standard deviation value was 158.0±55.6 pg/ml. According to these results, it was determined that the taurine concentration in milk with subclinical mastitis was approximately 1.5 times lower than in healthy milk (P<0.05). A significant negative correlation was determined between the taurine concentration in cow's milk with subclinical mastitis and the number of somatic cells (r= -0.933; P<0.001).

Table 2. CMT scores and SCC in milk samples from the control group CMT: California mastitis test, SCC: Somatic cell count

Cow number		Mammary quarters			
		A	B	C	D
1	CMT score	-	-	-	-
	SCC	3	3	2	3
2	CMT score	-	-	-	-
	SCC	1	1	1	1
3	CMT score	-	-	-	-
	SCC	1	1	1	1
4	CMT score	-	-	-	-
	SCC	1	2	3	2
5	CMT score	-	-	-	-
	SCC	2	1	2	3
6	CMT score	-	-	-	-
	SCC	1	2	3	2
7	CMT score	-	-	-	-
	SCC	1	3	2	2
8	CMT score	-	-	-	-
	SCC	1	1	2	0
9	CMT score	-	-	-	-
	SCC	1	1	1	1
10	CMT score	-	-	-	-
	SCC	2	3	4	2
11	CMT score	-	-	-	-
	SCC	3	4	5	3
12	CMT score	-	-	-	-
	SCC	1	1	1	1
13	CMT score	-	-	-	-
	SCC	1	0	2	1
14	CMT score	-	-	-	-
	SCC	2	3	1	2
15	CMT score	-	-	-	-
	SCC	2	1	2	3
16	CMT score	-	-	-	-
	SCC	2	2	3	1
17	CMT score	-	-	-	-
	SCC	1	0	2	1
18	CMT score	-	-	-	-
	SCC	2	2	2	2
19	CMT score	-	-	-	-
	SCC	2	1	0	3
20	CMT score	-	-	-	-
	SCC	2	2	2	2

Table 3. CMT scores and SCC in milk samples from the subclinical mastitis group CMT: California mastitis test, SCC: Somatic cell count

Cow number		Mammary quarters			
		A	B	C	D
1	CMT score	+	+	+	+
	SCC	4	5	5	6
2	CMT score	+	+	+	+
	SCC	6	7	6	5
3	CMT score	+	+	+	+
	SCC	8	6	5	7
4	CMT score	+	+	+	+
	SCC	3	5	5	3
5	CMT score	+	+	+	+
	SCC	4	4	3	5
6	CMT score	+	+	+	+
	SCC	5	6	5	5
7	CMT score	+	+	+	+
	SCC	3	4	5	6
8	CMT score	+	+	+	+
	SCC	4	4	4	4
9	CMT score	+	+	+	+
	SCC	5	4	6	5
10	CMT score	+	+	+	+
	SCC	5	5	5	5
11	CMT score	+	+	+	+
	SCC	3	3	5	5
12	CMT score	+	+	+	+
	SCC	4	4	4	4
13	CMT score	+	+	+	+
	SCC	2	3	4	2
14	CMT score	+	+	+	+
	SCC	4	3	2	2
15	CMT score	+	+	+	+
	SCC	3	2	4	2
16	CMT score	+	+	+	+
	SCC	6	7	5	4
17	CMT score	+	+	+	+
	SCC	7	7	6	7
18	CMT score	+	+	+	+
	SCC	3	2	3	3
19	CMT score	+	+	+	+
	SCC	4	4	4	4
20	CMT score	+	+	+	+
	SCC	4	3	2	5

Table 4. Somatic cell counts of the groups

Groups	Somatic cell count (x 10^5 cells/ml)
Control group	1.85±0.81
Subclinical mastitis group	4.55±1.23*

*P<0.001, Mann-Whitney *U* test

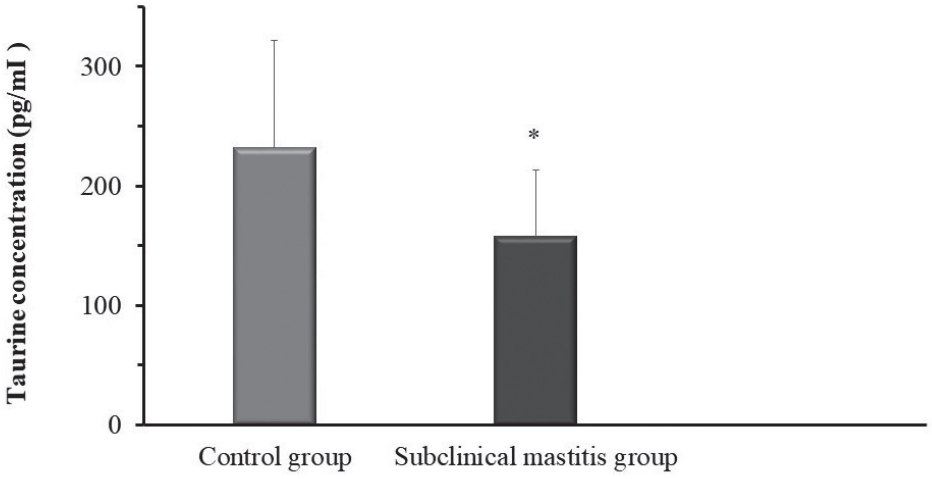

Fig. 1. Taurine concentrations in milk from the subclinical mastitis and control groups
* P<0.05, Mann Whitney *U* test

Discussion

Subclinical mastitis continues to impose an economic burden on the dairy industry worldwide (KIMURA et al., 2012; GONÇALVES et al., 2016; ALEKISH et al., 2017; MPATSWENUMUGABO et al., 2017). In subclinical mastitis, there is no visible abnormality in milk without mammary symptoms (XU et al., 2015; TURK et al., 2017). If the subclinical form is left untreated, it has the potential can cause severe drops in milk production, milk quality, and reproductive efficiency (LESLIE and DINGWELL, 2000; SCHRICK et al., 2001; SWINKELS et al., 2005; STEENEVELD et al., 2007). Therefore, subclinical mastitis should be diagnosed early, and cows affected by subclinical mastitis controlled and disease progression prevented (LESLIE and DINGWELL, 2000). To perform more efficient treatment plans to stop cases of subclinical mastitis from progressing to clinical forms, it is critical to have a thorough understanding of the inflammatory process in the mammary gland.

Somatic cells count in milk is mainly considered in the diagnosis of subclinical mastitis (SCHALM et al., 1971; NICKERSON, 1985; DOMAŃSKA et al., 2022). The main changes in milk with subclinical mastitis are: an increase in the number of somatic cells in milk, transfer of plasma proteins to mammary tissue, changes in the ion content in milk (CHAMINGS et al., 1984; KILIÇOĞLU et al., 1989; HILERTON and WALTON, 1991; KIRK, 1993), destruction of mammary tissue cells, intracellular passage of compounds and enzymes into the milk, and a decrease in the synthesis capacity of the mammary gland epithelium (SCHALM et

al., 1971; SCHALM, 1977; NICKERSON, 1985). In this study, it was determined that the number of somatic cells in the milk of healthy cows was 1.85±0.81 x 10^5 cells/ml, and the number of somatic cells in the milk of cows with subclinical mastitis was 4.55±1.23 x 10^5 cells/ml. Measurement of NAGase activity, a lysosomal enzyme, in milk with subclinical mastitis is also used as a marker (NIZAMLIOGLU et al., 1992; RASMUSSEN et al., 2008; PREETHIRANI et al., 2015). In the diagnosis of subclinical mastitis in dairy cows, the milk amyloid A measurement is also used in considering the number of somatic cells in milk (KOVAČEVIĆ-FILIPOVIĆ et al., 2012; MIGLIO et al., 2013). Ceruloplasmin measurements in milk also diagnose subclinical mastitis in cows (SZCZUBIAŁ et al., 2012). Lactose, inorganic phosphorus, sialic acid, potassium, nonfat dry matter, and total dry matter levels decrease, sodium and chlorine levels increase, and alkaline phosphatase activity increases in milk with subclinical mastitis (BOZHKOVA and TSVETKOV, 1976; MALEK DOS REIS et al., 2013). In addition, while serum albumin and gamma-lactoglobulin levels increase, alpha-lactoglobulin and beta-lactoglobulin levels decrease (BOZHKOVA and TSVETKOV, 1976). Acid phosphatase, glutamic-oxaloacetic transaminase, catalase, xanthine oxidase, lactate dehydrogenase, lipase, lysozyme, plasmin, α1-antitrypsin, β-glucuronidase levels also increase in milk with subclinical mastitis (RASMUSSEN et al., 2008). It was reported that the concentration of interleukin-8 in the milk of cows with subclinical mastitis was higher than in the milk of healthy cows. Researchers have stated that although the number of somatic cells in milk is mainly considered in diagnosing subclinical mastitis, measurement of interleukin-8 in milk can also be used (SAKEMI et al., 2011). Haptoglobin measurements, together with somatic cell count, in milk from Holstein cows are helpful in the laboratory diagnosis of subclinical mastitis (SAFI et al., 2009).

Taurine is essential in developing the central nervous system, eyes, and other tissues in the fetal and neonatal periods (BRYSON et al., 2001). Taurine deficiency in fetal life and lactation period causes fetal and postnatal growth retardation (EJIRI et al., 1987; HU et al., 2000b). Kittens deprived of taurine have been reported to have gait and thoracic kyphosis characterized by abnormal hind limb development, excessive abduction, and paresis (STURMAN et al., 1985). Kittens whose mothers are deficient in taurine have low survival rates, with surviving kittens developing developmental abnormalities (STURMAN, 1991). Vision loss due to retinal degeneration has been reported in mice with taurine transporter gene defects (HELLER-STILB et al., 2002). Taurine is a prospective target for the therapy of Alzheimer's disease and other neurological illnesses since it has been demonstrated to protect against the neurotoxicity of beta-amyloid and glutamate receptor agonists (LOUZADA et al., 2004). Taurine has been reported to block beta-amyloid protein neurotoxicity in rat hippocampal and cortical neuron cultures (PAULA-LIMA et al., 2005). In rats under physical and emotional stress, taurine released from the supraoptic nucleus inhibits the electrical activity of neurons secreting vasopressin at the supraoptic nucleus level and decreases vasopressin secretion in both central and peripheral nervous systems (ENGELMANN et al., 2001).

Taurine is known to be present in the milk of many mammals (STURMAN et al. 1977; STIPANUK et al., 1984; SHENNAN and McNEILLIE, 1994; HU et al. 2000a; UEKI and STIPANUK, 2007; MANZI and PIZZOFERRATO, 2013). According to the report of MANZI and PIZZOFERRATO (2013), cow's, sheep, and buffalo milk contain 0.60 mg/100 g, 6.55 mg/100 g, and 7.32 mg/100 g of taurine, respectively. The taurine content in pig's milk has been reported to be 1238 μmol/l (SARWAR et al., 1998). HU et al. (2000a) been reported that the concentration of taurine in colostrum in rats is approximately 200 μmol/dl and gradually declines to a plateau (below 100 μmol/dl) after the 5th day of lactation. In our study, the taurine concentration in healthy cow's milk was determined as 0.81±0.04 pg/ml. We measured taurine concentrations as 0.72±0.02 pg/ml in cow's milk with subclinical mastitis. In addition, a significant negative correlation was determined between the taurine concentration in cow's milk with subclinical mastitis and the number of somatic cells ($r= -0.933$, $P<0.001$).

Conclusions

Since taurine is associated with membrane stabilization, cell development, cell signaling, cellular osmoregulation, calcium homeostasis, retinal and cardiac function, antioxidative activity, detoxification, neuroprotection, neuromodulation, and brain development, the concentration of taurine in milk which satisfies nutritional needs for both humans and animals is crucial for health. The results of the present study revealed that taurine content was lower in cow's milk with subclinical mastitis than in healthy cow's milk. Strengthening the hypothesis that the determination of the taurine concentration in milk along with the somatic cell count in monitoring udder health in cows, the results of this study can be used in the diagnosis of subclinical mastitis, which is a crucial udder health problem in dairy cows in our country, as well as in dairy cows all over the world, and is expected to make a significant contribution to developing possible new treatment strategies.

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Author contributions

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TORUNOGLU, E. I, G. F. YARIM: Utjecaj supkliničkog mastitisa na koncentraciju taurina u mlijeku mliječnih krava. Vet. arhiv 94, 95-108, 2024.

SAŽETAK

Cilj je istraživanja bio procijeniti ulogu taurina kod supkliničkog mastitisa krava i odnos između koncentracije taurina u mlijeku i broja somatskih stanica. U istraživanju je upotrijebljeno četrdeset uzoraka mlijeka dobivenih za vrijeme laktacije od mliječnih krava dobi od 3 do 6 godina. Kalifornijskim mastitis testom (CMT) i pomoću broja somatskih stanica (SCC) potvrđen je supklinički mastitis u mliječnih krava. Pokusna skupina sa supkliničkim mastitisom obuhvatila je 20 uzoraka mlijeka pozitivnih na CMT i sa SCC-om većim od 200 000/mL mlijeka. U kontrolnoj je skupini bilo 20 uzoraka mlijeka negativnih na CMT-u i sa SCC-om manjim od 200 000/mL u mlijeku. Za određivanje koncentracije taurina u uzorcima mlijeka upotrijebljen je dijagnostički komplet za neizravnu imunoenzimsku reakciju specifičan za analizu taurina u goveda. Ustanovljene su koncentracije taurina u mlijeku, i to 232,1±89,8 pg/mL u kontrolnoj skupini i 158,0±55,6 pg/mL u skupini uzoraka dobivenih od krava sa supkliničkim mastitisom. Rezultati su pokazali da je koncentracija taurina u uzorcima mlijeka krava sa supkliničkim mastitisom oko 1,5 puta manja u usporedbi s uzorcima mlijeka od zdravih krava ($P<0,05$). Uočena je znakovita negativna korelacija između koncentracije taurina u mlijeku krava sa supkliničkim mastitisom i broja somatskih stanica ($r= -0,933$; $P<0,001$). Na temelju rezultata ovog istraživanja zaključeno je da se i broj somatskih stanica i Kalifornijski mastitis test kojim se određuje koncentracija taurina u mlijeku mogu upotrijebiti u praćenju zdravlja mliječnih žlijezda.

Ključne riječi: krava; mlijeko; supklinički mastitis; taurin