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Protective Effect of Raw Goat Milk against Aspirin induced Gastric Ulcer in Rats

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Abstract

This research was begun in Najaf section with in a time from 17/9/2019 to 22/10/2019 to investigate goat milk potential protection against sharp gastric mucosal injury by aspirin.

Kufa veterinary medicine college empirical animals laboratory provided about (32) Sprague Dawley male rats (275-320g).

All rats have been housed under regular laboratory settings (22–24°C, 60% humidity, etc.).

As detailed in the following section, the critters were split in the four equal random batches, each with eight rats:

- Controlling batch (C).

- Initial processing batch (T1); raw goat milk (5 ml /day) was given orally, once per day.

- Second processing batch (T2); was given oral 100 mg /kg body weight of aspirin medication, once per day.

- Third processing batch (T3); taken tube orally 5ml/day goat milk and 100 mg /kg body weight aspirin medication, once per day.

Accordingly: The area of stripping and level of liner ulceration in the goat milk-aspirin group were substantially fewer than in the conventional trophic-aspirin batch ($p < 0.05$).

Keywords: Goat milk, Aspirin, Rats.

Introduction

Aspirin and other nonsteroidal anti-inflammatory medicines (NSAIDs) cause significant morbidity and death from gastric and duodenal ulcer toxicity, especially by inducing gastrointestinal (GI) bleeding (Cardile, S. et al., 2016).

Low-dose aspirin is the single most cost-effective drug for preventing thrombotic complications (Roberge, S. et al., 2017), but it is associated with intracranial or major extracranial events (Pignone, M. et al., 2010), likewise prolonged bleeding, the most common side effects from aspirin are related to the upper gastrointestinal tract (GIT), the side effects of aspirin range from severe side effects such as PUD (peptic ulcer disease) to mild conditions such as dyspepsia and severe GI bleeding (Valkhoff VE. et al., 2012).

Goat milk output is increasing globally, with the majority of goat milk utilized fresh or in processed goods like cheese or yoghurt (Miller & Lu, 2019; Sepe & Argüello, 2019). Goat milk is regarded to contain significant antioxidant activity, which helps consumers avoid oxidative stress by resisting oxidative stability. Many acute and chronic disorders have this trait (Dı´az-Castro J. et al., 2014).

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Different human diseases, such as necrosis, cardiovascular illness, malignant growth, neurological confusion, Parkinson's dementia, Alzheimer's sickness, inflammatory disease, muscular dystrophy, liver disorder, and even aging, are all caused by oxidative stress (Amit and Priyadarsini 2011).

ROS and other free radicals have an important role in a variety of degenerative disorders (Li W. et al., 2009). Antioxidants protect organisms from free radicals, but a sufficient amount of antioxidants is required to counteract the damage caused by these radicals (Vasundhara S.H. et al., 2008).

Fresh milk consumption is recommended, especially breastfeeding, as a significant wellspring of antioxidants to prevent or minimize oxidative damage in numerous bodily tissues. Furthermore, researches have revealed that goat and other animal milk contain antioxidants (Chen J. et al., 2002; Simos Y. et al., 2011).

In this work, we looked at goat milk's potential to protect against aspirin-induced acute stomach mucosal injury.

Materials and methods

This study was begun in Najaf section with in a time from 17/9/2019 to 22/10/2019 to investigate goat milk potential protection against sharp gastric mucosal injury by aspirin.

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This study continued three weeks and all macroscopic assessments were made shortly next rats scarification and transporting part of the stomachs of groups to histological measurements at the conclusion of the experiment.

Chemicals that were used: In distilled water, aspirin (25 mg/ml) was dissolved. After validating their solidity and homogeneity, the suspension was prepared two hours before usage.

Collection of milk: After an MRT ring test and a CMT inspection confirmed that her milk was secured and free of Brucella illness and mastitis, milk was taken from a sanitary 2.5 year

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old goat after 30 days of parturition every morning, milk is collected after the under has been cleansed and dried each time, the milk was hand milked after being sterilized with 70% ethyl alcohol. The milk was filtered using a Millipore filter unit (WhatmanNo.1 filter sheets with 0.45 mm in diameter holes) and the physical and chemical test of the used pure milk was carried out. In the testing, the eco-milk analyzer was employed, as stated in table 1: -

COMP.	**FAT%**	**PROTEIN %**	**LACTOSE %**	**ASH%**	**SNF%**	**PH**	**DENSITY g/Cm3**
	3.65 ± 0.08	**3.20 ± 0.09**	**3.90 ± 0.05**	**0.75 ± 0.06**	**8.61 ± 0.13**	**7.02 ± 0.05**	**1.026 ± 0.003**

Macroscopic evaluation of stomach mucosal harm:

All macroscopic assessments were done right after the rats were scarified and before, half of their stomachs were sent to the physiology lab. According to the degree of hyperemia and hemorrhagic erosions, a semi-quantitative scale was developed and rated from 0 to 4 as pursue: (0-ordenary mucosa); (0.5-hyperemea); (1- corrosions); (2-hard corrosion); (3-very hard corrosions); (4-mucosal lesions throughout the stomach such as hemorrhagic corrosions, hyperemia and vascular congestions) (Dokmeci D. et al., 2005).

Under a dissecting microscope, gastric mucosal erosions were assessed using a clear sheet with 1 mm2 scales. The rate of affected mucosal area to total mucosal area was intended. In comparison to the control batch, the proportion of aspirin-induced harm was assessed.

Histological evaluation of stomach mucosal harm:

Tissue specimens from one part of the stomach were taken and stored for histologic evaluation. Hematoxylin and eosin were used to stain five micrometer sections of paraffin-embedded tissues. A light microscope was used to examine tissue slides (Olympus BX51; Olympus Co.; Shinjuku-ku; TOKYO; JAPAN).

The severity of stomach mucosal injury was graded on a scale of 0 to 3 as the following: 0indicates normal; 1indicates mucosal erosion; 2 indicates mucosal and sub mucosal ulcers; 3indicate an ulcer that extends to the muscularis propria (Cashin CH. et al., 1977).

Inflammation of the mucosa and sub mucosa was also assessed, and the severity of the inflammation was graded on a scale of 0 to 3 as following: 0indicates no symptoms; 1indicates a mild case; 2indicate a moderate case; and 3indicate severe case (Kim TH. et al., 2013).

Analysis of statistical

The Analysis of statistical System, version 9.1, was used to collect data. To investigate significant differences between means, a one-way, two-way ANOVA, and least significant differences post hoc test were used $P< 0.05$ was used to determine statistical significance (SAS 2010).

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Results

Evaluation on a microscopic and histopathologic level:

On microscopic examination, neither the control batch nor batch1 had any mucosal or sub mucosal injury. Group 2 had microscopically visible hemorrhagic patches (arrows) in the stomach mucosa, and ulcers were generally broad and linear, with the risk of microscopic mucosal harm being significantly higher in groups 2 and 3 compared to the control batch ($p< 0.05$). However, group 3 had considerably less macroscopic mucosal injury than group 2 ($p< 0.05$). (Table 2, Figures 1, 2, 3).

Also there was no lesion in control group and group 1 on histological evaluation figure 6 (A, B). Necrosis of epithelial cells involving forming spaces in pits and neck areas (arrows) with presences of hemorrhage and infiltration of inflammatory cells (arrowheads) in affected areas were noted in batch 2, while batch 3 publically had small necrosis of epithelial cells (arrows) of pits area with presence of inflammatory cells (arrowheads) in neck and isthmus areas confined to shallow mucosa.

Batch2 had profound ulcers linking the submucosa, while batch 3had nothing ($p< 0.05$) (Table 2, Figure 4, (A, B, C) 5, (A, B).

Mucosal and submucosal inflammation was absent in control group and 1 group Figure 6, (A, B). Group 2 had severe inflammation, but group 3 had mild inflammation that was considerably lower ($p< 0.05$) than group 2. (A, B, C) 5; Table 2, Figure 4; (A, B).

Table2. Goat milk Influencing on some histological parameters for masculine rats giving aspirin.

The treatments	Mucosal damage (Macroscopic)	Mucosal damage (Histological)	Inflammation (Score)
C	0.14 ± 0.35	0.62 ± 0.16	0.24 ± 0.45
1	0.00 ± 0.00	0.64 ± 0.16	0.12 ± 0.33
2	2.23 ± 0.43	2.01 ± 0.74	2.35 ± 0.53
3	1.52 ± 0.55	0.86 ± 0.53	1.27 ± 0.47

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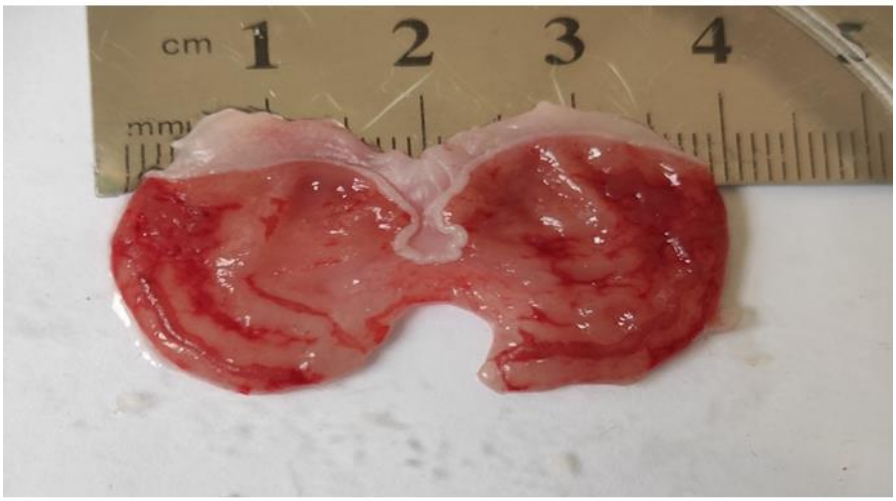

Figure 1: Photograph of stomach of control positive group rat.

Haemorrhagic patches (arrows) were observed in stomach mucosa

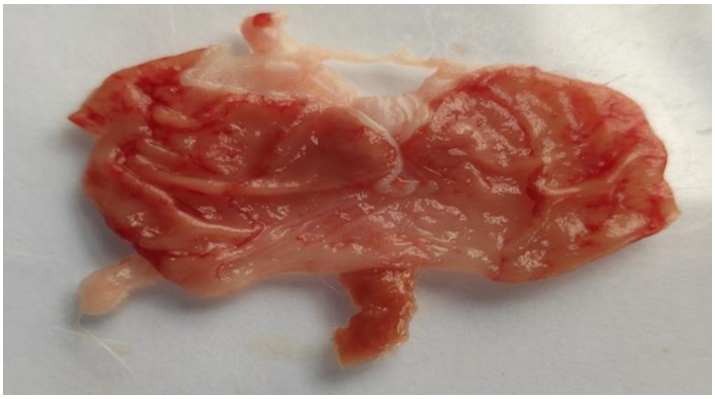

Figure 2: Photograph of stomach of treatment group rat.

Small haemorrhagic lines (arrows) were observed in stomach mucosa

Figure 3: Photograph of stomach of control negative group rat.

Normal stomach mucosa

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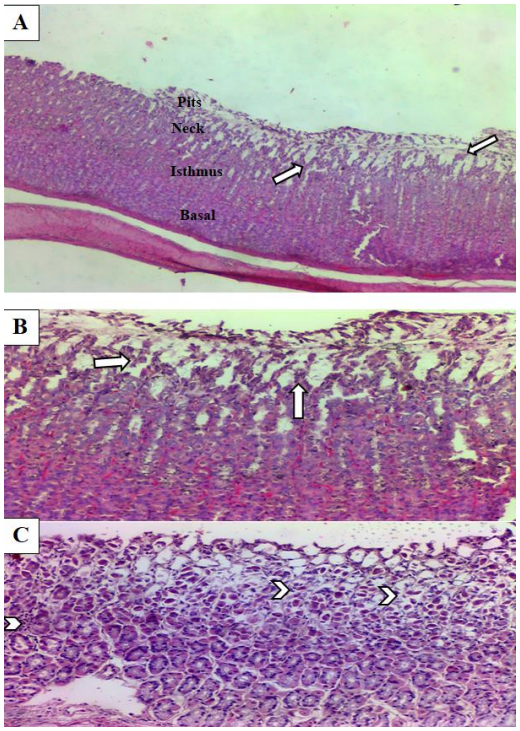

Figure 4: Photomicrograph of stomach of control positive group rat.

A, B&C/ Necrosis of epithelial cells involving forming spaces in pits and neck areas (arrows) with presences of haemorrhage in affected areas. Also, infiltration of inflammatory cells (arrowheads) in affected areas was observed. **H&E. A: x40 and B&C: x100.**

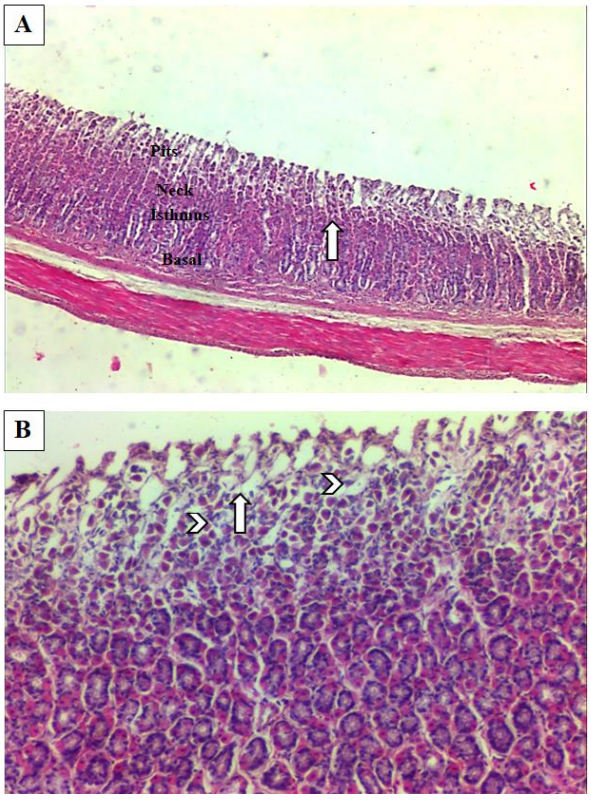

Figure 5: Photomicrograph of stomach of treatment group rat.

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A&B/ Necrosis of epithelial cells (arrows) of pits area with presence of inflammatory cells (arrowheads) in neck and isthmus areas. **H&E. A: x40 and B: x100.**

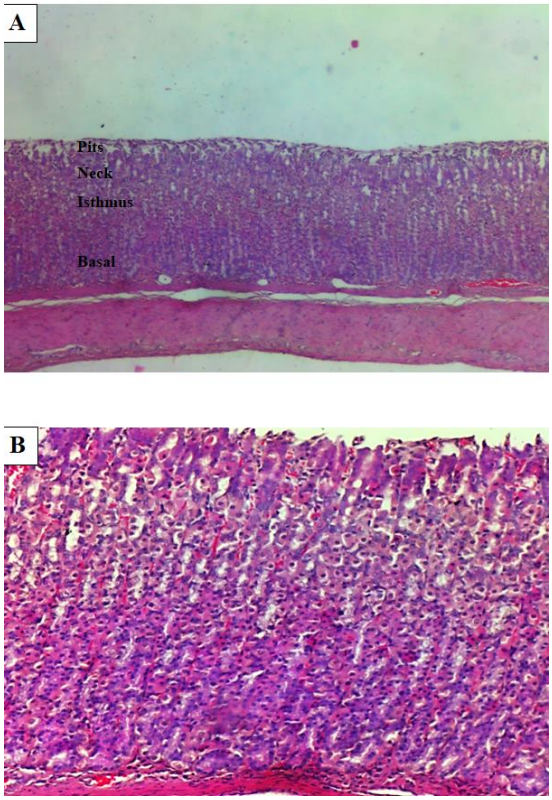

Figure 6: Photomicrograph of stomach of control negative group rat.

A&B/ Normal gastric architecture. **H&E. A: x40 and B: x100.**

Discussion

The stomach mucosa's integrity is maintained through a dynamic process in which defensive forces balance the impacts of aggressive factors, when this balance is broken, gastric mucosal damage develops (Ramakrishnan K and Salinas RC., 2007).

Aspirin given to rats replicates the possible NSAIDs-induced gastrointestinal harm caused by members of this therapeutic class (Pohle T et al., 2001; Jainu M et al., 2006; Mukherjee M et al., 2010; Ogawa K et al., 2011)**.** Aspirin is the most frequently used NSAID due to its important function in coronary and stroke prevention (Sanmuganathan P. et al., 2009; Inzitari D et al., 2010), as well as the treatment of numerous inflammatory disorders (Tsumura H et al., 2007).

All of the positive controls displayed epithelial erosions and inflammatory infiltrates around the ulcer, which are typical in aspirin-induced stomach ulcers (Berenguer B et al., 2007).

Goat milk is utilized in a variety of ways (Clark, S. and Mora García, M.B, 2017). The most common industrial applications are marketing for direct consumption as fluid milk, which is highly accepted due to its minimal allergenicity, and dairy processing (Barłowska, J. et al., 2011).

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Alférez MJ et al. (2001) discovered that goat's milk alkalizes the digestive tract and helps to elevate the pH level in the circulation, preventing stomach ulcers.

Due to its superior digestibility and dietary properties with smaller diameter fat globules, goat milk has a high biological value and nutritional attributes. In addition to its mineral and vitamin content, it has a chemical makeup that includes high-value proteins and important fatty acids (Haenlein, 2004; Park, et al., 2007).

The antibacterial capabilities of goat milk are conferred by higher levels of activity for both Lactoferrin and lysozyme (Bruhn CM and Schutz HG., 1999).

It's worth noting that goat milk has several properties that makes it differs from cow's milk, making it a great choice not only for infants, but also for adults and, in particular, nursing mothers (Razafindrakoto, O. et al., 1994).

In addition, the beneficial medium chained fatty acids contained in raw goat's milk, such as capric and caprylic acids, aid to fight against pathogens. It's important to note that raw goat's milk contains a lot of selenium, an important mineral with immune-boosting and antioxidant properties (Alférez MJ et al., 2001).

Adults with gastrointestinal problems and ulcers may benefit from the soft curd made from goat milk (Haenlein GFW., 2004). The goat milk strong buffering capacity appears to be helpful in the treatment of stomach ulcers (Park YW., 1994).

Conclusion

According to our findings, goat milk inflammation against and oxidation against capabilities can secure the stomach mucosa from aspirin-induced stomach injury. The positive results of this research could arrive to greater study into microbiological appreciation and more in-depth study could show even additional goat milk advantages. There should also be research on the recovery effects of goat milk on stomach injury and inflammation.

References

[1]. Alférez MJ, Barrionuevo M, López Aliaga I, Sanz-Sampelayo MR.and Lisbona F. (2001). Digestive utilization of goat and cow milk fat in malabsorption syndrome. J Dairy Res 68: 451-561.

[2]. Amit K. and Priyadarsini KI. (2011). Free radicals, oxidative stress and importance of antioxidants in human health. J Med Allied Sci. 1(2):53–60

[3]. Barłowska, J., Szwajkowska, M., Litwinczuk, Z. and Król, J. (2011). Nutritional value and technological suitability of milk from various animal species used for dairy production. Compr. Rev. Food Sci. Food Saf., 10, 291–302. [CrossRef]

[4]. Berenguer B, Trabadela C, Sánchez-Fidalgo S, Quílez A, Miño P and De la Puerta R. (2007). The aerial parts of Guazuma ulmifolia Lam. protect against NSAID-induced gastric lesions. Ethnopharmacol. 114(2):153-60.

[5]. L. N. Balai, G. K. J. A. K. S. (2022). Investigations on PAPR and SER Performance Analysis of OFDMA and SCFDMA under Different Channels. International Journal

Article Received: 10 April 2022; Revised: 05 May 2022; Accepted: 30 May 2022; Publication: 27 August 2022

on Recent Technologies in Mechanical and Electrical Engineering, 9(5), 28–35. https://doi.org/10.17762/ijrmee.v9i5.371

[6]. Bruhn CM. and Schutz HG. (1999). Consumer food safety knowledge and practices. J Food Safety 19: 73-87.

[7]. Cardile S., Martinelli M. and Barabino A. (2016). Italian survey on non-steroidal anti-inflammatory drugs and gastrointestinal bleeding in children. World J Gastroenterol 22:1877.

[8]. Cashin CH, Dawson W and Kitchen EA. (1977). The pharmacology of benoxaprofen (2-[4-chlorophenyl]-alpha-methyl-5-ben-zoxazole acetic acid), LRCL 3794, a new compound with anti-inflammatory activity apparently unrelated to inhibition of prostaglandin synthesis. J Pharm Pharmacol. 29: 330-6.

[9]. Chen J., Gorton L. and Akesson B. (2002). Electrochemical studies on antioxidants in bovine milk. AnalyticaChimicaActa. 474,137–146.

[10]. Clark, S. and Mora García, M.B. A. (2017). 100-Year Review: Advances in goat milk research. J. Dairy Sci., 100, 10026–10044. [CrossRef] [PubMed]

[11]. Dı´az-Castro J, Sa ´ nchez-Alcover A, Hijano S, Alfe ´rez MJ, Nestares T, Moreno M. (2014). Goat milk supplemented with folic acid protects cell biomolecules from oxidative stress-mediated damage after anemia recovery in comparison with cow milk. Eur J Nutr; 53: 116575.

[12]. Dokmeci D, Akpolat M, Aydogdu N, Doganay L and Turan FN. (2005). L-carnitine inhibits ethanol-induced gastric mucosal in-jury in rats. Pharmacol Rep. 57: 481-8.

[13]. Haenlein GFW. (2004). Goat milk in human nutrition. Small Ruminant Res 51:155e63.

[14]. Inzitari D, Piccardi B, Sarti C. (2010). A critical review of aspirin in the secondary prevention of non-cardioembolic ischaemic stroke. Int J Stroke.;5:306-18.

[15]. Jainu M, Mohan V. Devi S. (2006). Protective effect of Cissus quadrangularis on neutrophil mediated tissue injury induced by aspirin in rats. J Ethnopharmacol.:104;302-5.

[16]. Kim TH, Jeon EJ and Cheung DY. (2013).Gastro-protective effects of grape seed proanthocyanidin extracts against nonsteroidal anti-inflammatory drug-induced gastric in-jury in rats. Gut Liver. 7: 282-9.

[17]. Li W., Hosseinian F.S., Tsopmo A., Friel J.K. and Beta T. (2009). Evaluation of antioxidant capacity and aroma quality of breast milk, Nutrition, 25,105–114.

[18]. Miller, B. A., and Lu, C. D. (2019). Current status of global dairy goat production: An overview. Asian-Australasian Journal of Animal Science, 32, 1219–1232

[19]. Mukherjee M, Bhaskaran N, Srinath R, Shivaprasad HN, Allan JJ, Shekhar D. (2010). Anti-ulcer and antioxidant activity of GutGard. Indian J Exp Biol.;48:269-74.

[20]. Sharma, A. (2022). Some Invariance Results for Isometries. International Journal on Recent Trends in Life Science and Mathematics, 9(2), 10–20. https://doi.org/10.17762/ijlsm.v9i2.131

REDVET - Revista electrónica de Veterinaria - ISSN 1695-7504
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http://www.veterinaria.org
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[21]. Ogawa K, Oyagi A, Tanaka J, Kobayashi S, Hara H. (2011). The Protective Effect and Action Mechanism of Vaccinium myrtillus L. on Gastric Ulcer in Mice. Phytother Res. Aug 25(8):1160-5.

[22]. Park YW (1994). Hypo-allergenic and therapeutic significance of goat milk. Small Rumi Res 14: 151-9.

[23]. Park YW, Ju arez M, Ramos M and Haenlein GFW. (2007). Physico-chemical characteristics of goat and sheep milk. Small Rumin Res 68:88e113.

[24]. Pignone M, Alberts MJ and Colwell JA. (2010). Aspirin for primary prevention of cardiovascular events in people with diabetes: a position statement of the American Diabetes Association, a scientific statement of the American Heart Association, and an expert consensus document of the American College of Cardiology Foundation. Circulation. 121(24):2694–2701.

[25]. Pohle T, Brzozowski T, Becker JC. and Van Der Voort IR. (2001). Role of reactive oxygen metabolites in aspirin-induced gastric damage in humans: gastro-protection by vitamin C. Aliment Pharmacol Ther. 15:677-87.

[26]. Ramakrishnan K and Salinas RC. (2007). Peptic Ulcer Disease. Am Fam Physician. 76:1005-12.

[27]. Razafindrakoto O, Ravelomanana N and Rasolofo A (1994). Goat's milk as a substitute for cow's milk in undernourished children: A randomized double-blind clinical trial. Pediatrics 94: 65-9.

[28]. Roberge S, Nicolaides K, Demers S, Hyett J, Chaillet N, and Bujold E. (2017). The role of aspirin dose on the prevention of preeclampsia and fetal growth restriction: systematic review and meta-analysis. Am J ObstetGynecol 216(2):110–20.e6. doi:10.1016/j.ajog.2016.09.076.

[29]. Sanmuganathan P, Ghahramani P, Jackson P. and Ramsay L. (2009). Aspirin in the primary and secondary prevention of vascular disease: collaborative meta-analysis of individual participant data from randomized trials. Lancet. 373:1849-60.

[30]. SAS (2010). SAS/STAT. Users Guide for Personal Computer. Release 9.13. SAS Institute, Inc., Cary, N.C., USA.

[31]. Jamiatul Hasanah Siregar. (2022). Tree Stratification in the Permanent Plot of HPPB Andalas University Padang. Revista Electronica De Veterinaria, 25 - 32. Retrieved from https://www.veterinaria.org/index.php/REDVET/article/view/136

[32]. Sepe, L., and Argüello, A. (2019). Recent advances in dairy goat products. Asian-Australasian Journal of Animal Science, 32, 1306–1320.

[33]. Simos Y., Metsios A., Verginadis I., Angela-Gabriella D.A., Loiudice P., Jirillo E., Charalampidis P.,Kouimanis V., Boulaka A., Martemucci G. and Karkabounas S. (2011). Antioxidant and anti-platelet properties of milk from goat, donkey and cow: An invitro, ex vivo and in vivo study, International Dairy Journal. 21,901-906.

[34]. Tsumura H, Tamura I, Tanaka H, Chinzei R. and Masuda A. (2007). Prescription of non-steroidal anti-inflammatory drugs and co-prescribed drugs for mucosal protection: analysis of the present status based on questionnaires obtained from orthopedists in Japan. Inter Med. 46:927-31.

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Vol 23, No. 3 (2022)
http://www.veterinaria.org
Article Received: 10 April 2022; Revised: 05 May 2022; Accepted: 30 May 2022; Publication: 27 August 2022

[35]. Valkhoff VE, Sturkenboom MC and Kuipers EJ. (2012). Risk factors for gastrointestinal bleeding associated with low-dose aspirin. Best Pract Res Clin Gastroenterol. 26 (2):125–140.

[36]. Vasundhara S.H., Vijay K.L. and Jagan M. R. (2008). Influence of milk and sugar on antioxidant potential of black tea, Food Research International., 41,124–129.