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# Study on the Conventional and Traditional Treatment of Caprine Mastitis

M. A. SOLANGI, N. A. KOREJO[++], J. SOOMRO, A. SETHAR[**], R. A. KOREJO[*] A. A. KAMBOH, A. H. MIRANI, H. M. SOLANGI, A. A. CHANNA[***], P. MUNIR[****], S. A. SHAH B. KANWAL[**], T. JAMIL[**], J. A. SHAIKH[**]

Faculty of Animal Husbandry and Veterinary Sciences, Sindh Agriculture University Tandojam. Post code: 70060

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**Abstract:** Ethnoveterinary practices are very common in Pakistan due to the poor socioeconomic status of the rural farmers. The traditional veterinary healers are therefore getting more attention from farmers. Thirty mastitic goats were selected and divided into five equal groups viz; A, B1, B2, C1 and C2. Groups were treated as **A:** control (no treatment), **B1:** parental injections of amoxicillin with clavulanic acid and flunixinmaglumine, **B2:** trimethoprim with sulphadiazene and flunixinmaglumine, **C1:** oral treatment of Garlic (Allium Sativium L.) and Turmeric (Curcuma Longa L.), **C2:** Purple fleabane (Centratherum Anthelmenticum) and Turmeric (Curcuma Longa L.). The bacterial load of clinical mastitis before and after treatment was measured. The bacterial load was noticed significantly reduced in group B, followed by C compared with A at 7th and 14th day of conventional and traditional treatments respectively. Furthermore, on day 28th of trial the right teat bacterial load was significantly reduced in all treated groups vs control. Out of 1260 milk samples, the clinical and subclinical mastitis was observed in 65 (5.15%) and 226 (23.1 %) animals respectively. The temperature, pulse, respiration, udder circumference and cumulative bacterial load were elevated in untreated animals and on 0 day, which further subsides following treatment in different groups. The milk quantity was seriously reduced in mastitic goats, however some of the lost milk quantity was recovered following different treatments. It has been revealed that the medicinal plants can also be used effectively at very low cost but recovery is slow.

**Keywords:** Goat, Mastitis, Garlic, Purple fleabane, Turmeric, Clavet and Triberssin

## 1. INTRODUCTION

Among the oldest domesticated animals, the goat (*Caprahircu*) is one of the important milk and mutton producing animals. This animal is the main livelihood source for poor farmers in Pakistan. Goat population in the country is 72.2 million, producing 0.891 million tons of milk and 0.701 million tons of mutton (GOP, 2017).

Variety of bacterial infections can affect the goats, especially those rearing under high stocking density. Most of the production losses in goat industry/or farmers are being faced by mastitis. Dairy industry worldwide is being affected by many factors, among these mastitis is contributing a vital role (Ali, *et al*., 2011).

In response to an incursion of micro-organisms in the teat canal, leucocytes are being released into the mammary glands. The toxins produced by the micro-organisms leads to damage milk-secreting tissue and various ducts throughout the mammary gland. Usually the consequence of clinical mastitis is toxemia and gangrenous necrosis of the udder .The main physical indicators of clinical form of mastitis include , swelling, heat, redness and pain along with other symptoms such as anorexia, fever or agalactia. Furthermore, mastitis could be confirmed by the inconsistency of milk such as a watery appearance or presence of flakes, clots, pus etc (Omaleki *et al*., 2011).

The different gradation of udder inflammation and abnormal milk accompanied by general illness in the goat could be categorized as clinical mastitis. The presence of microbes in milk, lower down its production and milk consistency can vary from having a few milk clots to serum with clumps of fibrin in the secretion (Batawani *et al*., 2007). Many of the researchers' put prime motive on prevention and treatment of mastitis. Currently different strategies are being practiced for control of mastitis; viz. proper milking, sanitation and dry cow therapy with antibiotics (Goel *et al.*, 2008).

Distended and rigid udder, physiochemical deviations in milk and reduction in milk yield are the main features of clinical mastitis (Peer and Bhattacharya *et al.*, 2007). The sloughing of quarters, necrosis and serosangunious secretion are main features of per acute mastitis. However, when swollen udder becomes cyanotic it will be recognized as acute mastitis. In sub-acute mastitis there are inconstant variations in the milk without gross noticeable changes in the glandular tissues, whereas chronic mastitis is the terminal stage, in which the udder becomes rigid and supra-mammary lymph nodes become palpable (Radostits *et al.*, 2007).

[++] Corresponding author. Email: nakorejo@sau.edu.pk
*Shaheed Benazir Bhutto University of Veterinary and Animal Sciences, 67210, Sakrand, Pakistan.
**Directorate of Animal Breeding Sindh, Livestock Department, Hyderabad-71000.
*** Sindh Institute of Animal Health, Animal Science Complex, Korangi, Karachi, Pakistan.
****Livestock and Dairy Development Department Balochistan.

In dairy herds the mastitis provokes threat to developing countries such as Pakistan. This disease produces detrimental effects to all domesticated animals, by affecting its physicochemical properties of milk and by altering structure of parenchymal cells of udder (Chishty *et al.,* 2007).

The mastitis is the most common disease in livestock species including small ruminants that affects not only meat and milk production, but the wellbeing of animals and human health as well, (Abdullah *et al*., 2016).

The quality and quantity of milk is however deteriorated by mastitis, which is one of the most disadvantage and economic loss to dairy industry. Mastitis possess the reduction in milk quantity, burden of cost at treatment and premature culling of the animals (Sharif *et al.,* 2009). The most common type of mastitis recorded in goat is subclinical mastitis which is mainly caused by infectious bacteria (Persson and Olofsson, *et al.,* 2011). Timely diagnosis of mastitis with valid tests, enables effective treatment and control. The pursuance of sound healthy practices at dairy farms will reduce the losses to farmers (Sharif *et al*., 2009).

The commonly practiced antibiotic treatment for the cure of the clinical mastitis denotes poor results (Sandholm *et al.,* 1990). Failure of the antibiotics to reach the site of infection in adequate concentrations, development of resistance to antibiotics, bacterial dormancy, L-form of bacteria (which are not sensitive to the β-lactam type of antibiotics), detrimental nature of some antibiotics to phagocytosis and incompatibility of antibacterial with milk have been implicated for sub optimal results in the therapy of mastitis with antibiotics (Yousaf, *et al.,* 2009).

Numerous organisms have been associated with clinical and subclinical mastitis in goats, the commonest being bacteria. The most common causative organisms of udder disease include, *staphylococci*, *streptococci* and *coliforms* (mainly *E. coli*, *Enterobacteraerogenes* and *Klebsiella*pneumoniae). Other less frequent agents include, Corynebacterium, Pseudomonas, Nocardia, Mycoplasma, yeast and Caprine arthritis encephalitis virus (Shearer *et al*., 2003).

Ethnoveterinary medicine encompasses people's knowledge, skills, methods, practices and beliefs about the care of their animals (Deshmukh *et al*., 2011). It is practiced by the local people for the treatment of livestock diseases using different locally available materials (Ul Hassan *et al*., 2014). Plants are the most commonly used ingredients in the preparation of ethnoveterinary medicines (Abbasi *et al*., 2013). Pakistan is among the eight leading exporters of medicinal plants. Due to the presence of different topographical zones, Pakistan has wide diversity of herbal plants (Hussain *et al.,* 2004).

Local population often relies on traditional methods to manage health problems of animals due to their status and lack of veterinary facilities in the area. Moreover, traditional remedies are more readily available and cheaper than the conventional veterinary treatments. Therefore an attempt has been made to collect information on ethnoveterinary use of medicinal plants by the goat farmers for the treatment of different ailments in district Naushahroferoze, Sindh, Pakistan. Whereas about 80% of the world population depends on medicines from plants (Shah *et al*., 2009).

Medicinal plants have fewer side effects, they are easily available, cheaper and sometimes the only source of health cares for poor. All parts of the plants including leaves, bark, fruits, flowers and seeds are being used in medicinal preparations. Modern pharmacopoeia consists of at least 25% of drugs come from plant origin, 121 of active compounds are being obtained from the plants (Shinwari *et al.,* 2011).

## 2. MATERIALS AND METHODS

The survey of district NaushaheroFeroze was conducted and data about the prevalence of caprine (Mix breeds) mastitis was collected. The milk samples (n=2520) of goats (n=1260) were collected in sterile containers and screened by CMT, SFMT. Milk samples declared positive by CMT and SFMT were transported to the Department of Veterinary Microbiology, SAU Tandojam at 4 ˚C for checking bacterial load of samples.

The experimental research trial was performed on 30 registered clinical mastitic goats (Mix breeds; Tapri, Karmori and Taddy), selected from different farms. These goats were separated into three groups; A, B and C. Group A served as control, group B was further divided into two sub groups i.e. B1 and B2, which received prevailing conventional treatments. Similarly, group C was also divided into two sub groups i.e. C1 and C2 for receiving two different frequently used local traditional treatments. Each group was comprised of six goats, total treatment period was of five days, and however parameters were recorded for total four weeks.

**Table 1: Experimental Design**

| Groups | A Control | B Conventional Treatment (Parental) | | C Traditional Treatment (Oral Bolus) | |
|---|---|---|---|---|---|
| | | B1 | B2 | C1 | C2 |
| **No. of Goats** | 06 | 06 | 06 | 06 | 06 |
| **Treat-ments** | | 1. Inj. Clavet 1ml/20kg b/w (Selmore) 2.Inj. Loxin 2ml/45kg b/w (Selmore) | 1. Inj. Triberssin1-3ml /45kg b/w (Hilton) 2. Inj. Loxin 2ml/45kg b/w (Selmore) | 1. Garlic (*AllumSativium*) 25g/animal 2. Turmeric (*Curcuma LogaL.*) 3g/animal | 1. Purple fleabane (*Centratherum Anthelmenticum*) 5g/animal 2.Turmeric (*Curcuma LogaL.*) 3g/animal |

**Chemicals used:**

The following chemicals were used for consecutive 05 days to treat mastitic goat.

**Inj. Clavet** (Amoxicilline 14 % and clavulanic acid 3.5%) each vial contain 140 mg amoxicilline and 35 mg clavulanic acid as Potassium Clavulanate, @1 ml 20 /kg b/ w. i/m. **Inj. Loxin** (FlunixinMeglumine 50 mg) (USP), @ 2 ml per 45 kg b/w im. **Inj.Tribrissen**48% (each vail contain Trimethoprim BP 8% and Sulphadiazene 40%) @ 3ml per 45 kg b/w im. Inj.Loxin (FlunixinMeglumine 50 mg) (USP), @ 2 ml per 45 kg b/wim,

**Traditional commodities used:**

**Garlic** (*Allium sativium L.*) 25–30g/goat and **Turmeric** (*curcuma longa*) 3g/goat (Dilshad Rahman, 2010) were mixed with few drops of butter oil and bolus were prepared and offered orally once daily. Purple Fleabane***(Centratherumanthelminticum)*** 5g/goat and **Turmeric** 3g/goat were mixed with few drops of milk and then given orally once daily.

**Clinical observation**

Detailed history and specific mammary gland examination was carried out in individual mastitis infected goats. Information related sings of mastitis was collected from owners. Clinical parameter; rectal temperature, pulse, respiration rate and inspection of udder for detection of abnormalities that were inflammatory swelling, fibrosis of mammary tissues were also recorded.

**Milk sampling plan**

All milk samples were taken aseptically at Day zero, and after treatment at $7^{th}$, $14^{th}$ and $28^{th}$ day.

**Management and storing of samples.**

The crushed ice was used for short storage and transportation of milk samples to laboratory, Department of Veterinary Microbiology, SAU Tandojam.

**Interview of traditional healers:**

A total of 518 goat farmers were interviewed. The plants frequently used by farmers were either got from farmers or purchased from nearby market. These herbs were being identified up to the species level by the experts working at faculty of Crop Production, SAU Tandojam.

**Parameters of study**

Following parameters were studied. The clinical examination parameters were recorded before treatment and then weekly basis for consequent three weeks.

- Prevalence
- Temperature of body
- Rate of pulse per min.
- Rate of respiration per min.
- Udder confirmation
- Bacterial loads

The temperature of body, pulse rate, respiration rate and udder confirmation were measured between 9:00am to 12 noon on weekly basis. The temperature was measured by thermometer (human use) in $^{o}$F, pulse rate per minute was measured through femoral artery beneath the thigh and respiration rate per minute was measured by placing stethoscope on trachea. The udder size was measured through it's circumference at widest middle part by measuring tap in centimetres (cm). Palpation and inspection of udder in terms of detection of in duration, fibrosis, inflammatory swelling and atrophic changes were recorded.

**Milk sampling**

After clinical examination, goat Milk sample was collected from each and every individual halves of each mastiticgoat in sterilized vial. Firstly, udder and teat were washed with proper disinfectant solution and dried with clean towel. Then teat was wiped with an individual cotton soaked in 70% alcohol, then dried. The milk samples were collected aseptically from both halves of the udder viz. left (Lt) and right (Rt) (Singh *et al.*, 2007).

**1. Physical examination of milk**

Milk quantity, color (discoloration: watery or bloody),consistency and clots presence, flaks and visual irregularities.

**2. Milk tests**

Diagnostic tests for Mastitis

Indirect Detection of Mastitis in goats

- **Surf tests**
- **CMT**

**Surf Field Mastitis Test**

The SFMT was accomplished according to the methodology defined by (Muhammad *et al.*,1995). In brief, the cups containing surf solution of 4% were mixed with 2 ml milk samples. These were then mixed by gentle circular motion in a horizontal plane for few seconds. The samples with increased somatic cell count showed instant reactions.

**California Mastitis Test**

The cases of subclinical mastitis were screened out by using CMT kit. The mixing up of similar quantity of milk sample and CMT reagent served the investigation purpose. The reaction was observed quickly within the samples containing a high concentration of somatic cells (Islam *et al.*, 2011).

**Milk sample culture:**

Milk samples were transported and brought to the department of Veterinary microbiology, Faculty of Animal Husbandry and Veterinary Sciences for culture, before start of trial, then, on 7$^{th}$ days.14$^{th}$days and 28$^{th}$ days of treatment, for checking bacterial load of the samples.

**Bacteriological Analysis**

**Sterilization**

All equipment were sterilized at standard methods. Aseptically the CMT positive milk samples were collected for micro-organisms load check. Milk samples were stored immediately with ice-packs. Samples then activated by incubation for 12 hours at 37°C first, and then cultured within 24 hours after collection.

**Media Preparation (Nutrient agar):**

Nutrient agar 2.8g was added into 100 ml of distilled water in conical flask and it was mixed by magnetic capsule for 8 to 15 minutes at temperature 50 to 60 °C. After fully dissolved agar, the conical flask was closed by cork and cloth and then processed for autoclaving at 121°C and 15 psi for 2 hours.

**Total viable counting**

Total viable counting of isolated bacteria was done according to (Miles and Misra 1938). Briefly, the milk samples were 10-fold diluted, from $10^{-1}$ to $10^{-10}$. Using a pipette, calibrated at 25 ul (dropping 40 drops per ml), a drop from each of the different dilutions was placed on separate surface of agar plates; each drop appropriately labeled, with respect to the dilution factor. The plates were left on the bench to dry after which they were incubated at 37°C for 18–24 hours. Where countable, colonies were counted for each drop. The number of colony forming units (CFU) per ml was then calculated according to (Miles and Misra 1938).

Total bacterial counts gives total bacterial counts, presented in 100-fold groups, per county and collectively. Majority of the samples from the three counties fell in the lower bracket of (100-199CFU/ml and 1000-1999CFU/ml) with the highest number of count being in the lowest bracket 100-199CFU/ml. Meru county 67% recorded the highest number of total bacterial counts in this bracket.

**Data analysis**

Collected data was analyzed through two way ANOVA by the statistical program graph pad prism (v.5). **(Table 2)**

**Table 2: The survey report of ethno veterinary shows the list of most frequent used plants by the goat owners for the treatment of caprine mastitis at district NaushahroFeroze (n=518)**

| Plant species | Family name | Local name | Plant part Used | Preparation and administration | No. of informants reported usage | % |
|---|---|---|---|---|---|---|
| *Allium sativum L.* | Alliaceae | Thoom/ Lehsan | Rhizome | grinded and administered with butter orally | 105 | 20.27 |
| *Centratherumanthel misticum L.* | Compositae | Kaarijeeri/ Kaalizeeri | Seed | Added in wheat flour then used orally for 5 days. | 78 | 15.05 |
| *Curcuma longa L* | Zingiberaceae | Haida/ Haldi | Root | grinded with sugar and given orally | 68 | 13.12 |
| *Lawsoniainermis L.* | Lythraceae | Mehindi | Leaves | Mixture of L. inermisleaves,T. ammi seeds, A. cepa bulbs and sugar candy administered per os | 57 | 11.00 |
| *Allium cepa L.* | Amaryllidaceae | Bassar/ Piyaaz | Bulb | Grated bulbs mixed with CannumL .powder and administered per os | 35 | 6.75 |
| *CitrusIimn (L.) Burm F.* | Rutaceae | Leemo/Leemon | Fruit | fresh juice mixed with sugar, water and administered per os | 32 | 6.17 |
| *Capsicum annuum L.* | Solanaceae | Mirch | Fruit | Dried fruit powder simmered in water and given per os | 26 | 5.01 |
| *Trachyspermumammi (L.) Sprague* | Apiaceae | Jarue | Seed | round seeds mixed with jaggeryand given per os | 23 | 4.44 |

## 3. RESULTS

### Prevalence percentage of clinical and sub clinical caprine mastitis in district Naushahroferoze

The random survey was done at the vicinity of main cities of district NaushahroFeroze. Where, total 1260 goats were sampled for diagnosis of clinical and subclinical mastitis. The clinical and subclinical mastitis was found in 65 (5.15%) and 226 (23.1 %) animals respectively, however 969 goats showed no signs of mastitis. Moreover, clinical mastitis was noticed in 24 left halves, 37 right halves and 04 in both halves. However, in subclinical case, the involvement of left, right and both halves were 82, 99 and 45 respectively. Details of results are presented in **(Tabel-3).**

**Table-3: Prevalence percentage of clinical and sub clinical caprine mastitis in district Naushahroferoze.**

| S. | Places/ Cities | No. of goat screened | Total no of quarter milk sample screened | Total no of goat positive for Clinical mastitis % | Total no of goat positive for Subclinial mastitis % |
|---|---|---|---|---|---|
| 1 | BHRIA | 347 | (694) | 18 (5.92) | 65 (18.7) |
| 2 | KANDIARO | 304 | (608) | 16 (5.26) | 60 (19.7) |
| 3 | MEHRABPURE | 200 | (400) | 12 (6.0) | 33 (16.5) |
| 4 | NAUSHAHRO | 217 | (434) | 13 (5.99) | 32 (14.7) |
| 5 | MORO | 192 | (384) | 6 (3.12) | 36 (18.8) |
| | T0TAL | 1260 | 2520 | 65 (5.15) | 226 (23.1) |

### The clinical signs of mastitic goats

The clinical examination of goats before and after treatment was done. The physical examination of goats suffering from mastitis showed signs of anorexia, depression, and udder was found swollen, red, hot, with few flecks in the milk and the color of milk was noticed yellowish, bluish. The rectal temperature was a bit risen, moreover, the pulse and respiration rate were also increased.

The average normal healthy goat parameters were recorded before starting of experiment. Twelve (12) Teddy goats, selected from rural area of district NaushahroFeroze were used for this purpose **(Table 4)**.

**Table 4: Average parameters of normal healthy Teddy goats (n=12) were recorded before experiment.**

| S. | Parameter | Values |
|---|---|---|
| 1 | Temperature ($^{O}$F) | 103. ± 0.55 |
| 2 | Respiration/minute | 20.30. ±0.84 |
| 3 | Pulse rate/min. | 80 ± 0.95 |
| 4 | Udder circumference (cm) | 10-12 ±O.22 |
| 5 | Milk quantity/milking (evening) in ml | 250 ±16.66 |

### Temperature, Pulse and Respiration

In the present study, the body temperature of experimental goats **(Table 5)** was found slightly increased in untreated group. Moreover, it was noticed significantly decreased in almost all treated groups from day 7 to 28, compared with untreated group "A". However, the animals of group B1 shows statistically no difference of body temperature at 28$^{th}$ day of treatment, which still comes under the normal range of goat body temperature.

The pulse and respiration rate per minute was found significantly decreased in all treated groups compared with control **(Table 5).**

**Table 5: The mean ± SEM values of the clinical sign of temperature, pulse and respiration in goat observed before and after treatment for caprine mastitis.**

| Parameters | Days | Group A | Group B1 | Group B2 | Group C1 | Group C2 |
|---|---|---|---|---|---|---|
| **Temperature ºF** | | | | | | |
| | 0 | 103.35 ±0.35 | 103.21± 0.54 | 103.53±0.47 | 102.81±0.49 | 102.38±o.46 |
| | 7 | 103.40±0.36 | 101.33±0.25*** | 102.05±0.49* | 101.00±o.30*** | 101.73±0.32** |
| | 14 | 103.76±0.25 | 101.18 ± 0.26** | 101.78±0.49** | 101.28 ±0.27*** | 101.58±0.31*** |
| | 28 | 103.78 ± 0.22 | 102.56±0.37 | 100.95 ± 0.30*** | 100.75 ±0.25*** | 101.85 ± 0.21** |
| **Pulse rate/min.** | | | | | | |
| | 0 | 90.00±3.61 | 90.00±3.68 | 93.66 ±5.10 | 89.00±3.33 | 92.66±3.25 |
| | 7 | 90.00±3.61 | 74.66±1.11*** | 74.00±1.36*** | 74.33 ±1.08*** | 77.33±1.90 ** |
| | 14 | 91.00±3.29 | 74.66±1.11*** | 75.66±1.08*** | 76.33±1.20*** | 74.66±1.97*** |
| | 28 | 92..33±3.07 | 71.66±0.80*** | 73.66±1.49*** | 73.66±1.49*** | 72.66± 1.22 ** |
| **Respiration/min** | | | | | | |
| | 0 | 30.00±1.93 | 32.66±2.56 | 34.33±2.80 | 31.00±2.11 | 31.33± 2.04 |
| | 7 | 30.66±1.33 | 22.66 ±0.98** | 22.33±0.95** | 22.33±0.95** | 24.33± 1.74* |
| | 14 | 32.00±1,26 | 26.00±2.06* | 24.66±0.84** | 22.33±0.95*** | 23.66±1.74** |
| | 28 | 32.66±1.33 | 21.66±0.61*** | 21.33±0.66*** | 22.33±1.08*** | 25.00 ±1.34** |

Different length of asterisks shows significant differences between treated groups and control (within columns) at different time periods

**Udder circumference**

In the present study, the udder circumference of experimental goats **(Table 6)** was found slightly increased in untreated group "A". Moreover, it was noticed significantly decreased in almost all treated groups from day 7 to 28, compared with control. However, the udder circumference of group A showed significant progression at day 28th.

**Table 6: The mean ± SEM values of the udder circumference in goat observed before and after treatment of caprine mastitis.**

| Groups | Udder circumference (cm) | | | |
|---|---|---|---|---|
| | O day | 7 day | 14day | 28day |
| A | 15.45±0.29 | 15.36±o.26 | 15.85±0.22 | 17.38±0.48 *** |
| B1 | 16.25±0.36 | 13.00±0.33*** | 13.00±0.33*** | 12.71±0.31*** |
| B 2 | 16.80±0.58* | 12.46±0.28*** | 12.16±0.28 *** | 12.03±0.18*** |
| C1 | 16.70±0.47 | 14.58±0.62*** | 13.63±0.34*** | 13.18±0.22*** |
| C2 | 15. 46±0.29 * | 14.68±0.29*** | 13.46±0.23*** | 12.85±0.22** |

Different length of asterisks shows significant differences between treated groups and control at different time periods.

**Milk quantity**

In the present study, the milk quantity of experimental goats was found significantly decreased in untreated group. Moreover, it was noticed significantly increased in almost all treated groups from day 7 to 28, compared with untreated group "A". However, the animals treated with conventional method parentally in groups B1 and B2 showed statistically good difference of milk quantity at 28th day of treatment, compared with the traditional methods in groups C1 and C2 **(Table 7).**

**Table 7: The mean ± SEM values of the milk quantity observed before and after treatment of mastitic goats.**

| Groups | Milk Quantity (ml) | | | |
|---|---|---|---|---|
| | O day | 7 day | 14day | 28day |
| **A** | **60.83**±7.12 | **58.33**±6.79 | **53.83**±6.19 | **47.50**±6.68 |
| **B1** | **63.33**±7.92 | **162.50** ±11.67*** | **164.16**±12.54*** | **193.33**±16.66*** |
| **B 2** | **60.83**±7.12 | **162.50**±9.63 **** | **178.00**±8.62*** | **191.66**±8.03*** |
| **C1** | **55.83**±4.72 | **123.00**±**6.40***** | **154.16**±11.21*** | **163.33**±10.21*** |
| **C2** | **58.00**±5.88 | **105.00**±9.83. *** | **130.83**±.12.41*** | **155.00**±9.48 *** |

Different length of asterisks shows significant differences between treated groups and control at different time periods.

**Bacterial load**

The milk samples from 30 registered experimental goats were evaluated for bacterial load in different groups of the study. The colony forming unit had been done to determine the bacterial load in mastitic milk. The pre and post treatment CFU of goats of group A, B1, B2, CI and C2 have been recorded. The bacterial load, i.e., an aerobic plate count was CFU/ml of milk after treatment.

The bacterial load of right teat **(Fig. 1)** shows no statistical difference between all experimental groups at zero-day observation. However, it was noticed significantly reduced in group B, followed by C compared with control A at 7th and 14th day of conventional and traditional treatments respectively. Furthermore, on day 28th of experimental treatment the right teat bacterial load showed significantly reduced load in almost all treated groups vs control.

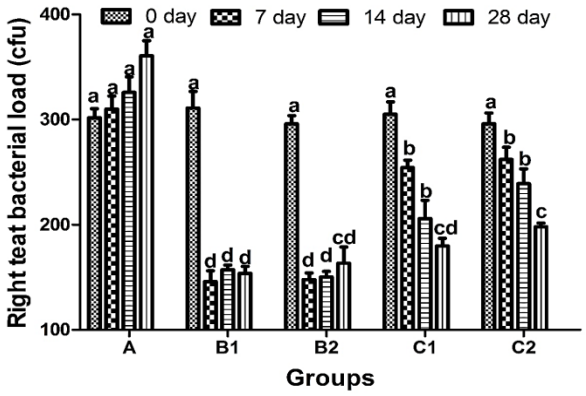


**Fig. 1: The bacterial load of right goat teat milk samples, examined through CFU per ml at 0, 7, 14 and 28th day following different treatments.**

Data are represented as mean ± SEM (n = 6), and different labels indicated significant differences among groups at $P < 0.05$.

Similarly, the bacterial load of left teat illustrated non-significant difference between all experimental groups at day zero. Moreover, on day 7 and 14 it was perceived that, the bacterial load was significantly reduced in animals treated with conventional methods followed by traditional means compared with control. However, on day 14 the bacterial load was markedly diminished in group B2 in comparison to B1 and C. Furthermore, these all treated groups depicted no statistical difference on day 28.

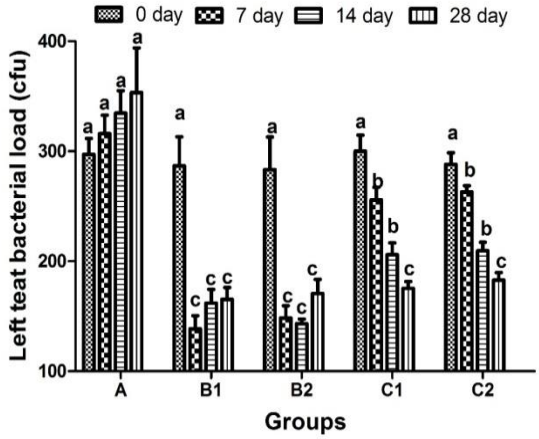


**Fig. 2. The bacterial load of left teat milk samples, examined through CFU per ml at 0, 7, 14 and 28th day following treatment of caprine mastitis.**

Data are represented as mean ± SEM (n = 6), and different labels indicated significant differences among groups at $P < 0.05$

## 4. DISCUSSION

The present study was conducted during the year 2018 at the district NaushahroFeroze in order to observe the comparative efficacy of the conventional and traditional treatment methods in caprine mastitis. Mastitis, regardless of the cause the inflammation of the mammary gland may involve numerous factors such as trauma, cold, improper milking technique and the infectious agent may be considered as the etiological and predisposing factors. In the precipitation of the disease in its clinical form the age, feeding, housing, lactation phase and season influences the severity of mastitis.

The animals which showed clinical mastitis based on clinical signs were included in this research. The experimental study was carried out on 30 animals diagnosed as affected from clinical mastitis. The milk samples of infected goats of different age groups were aseptically collected in sterile test tubes. These milk samples were then challenged to culture and examination of CFU load.

This study has observed the prevalence of caprine mastitis in district NaushahroFeroze through random survey in different farms of the cities. Where out of sampled 1260 goats 23.1% goats were found positive for sub-clinical and 5.15% for clinical form of the mastitis. Similarly, high prevalence rate (31.3%) was noticed in 729 studied ewes, which were confirmed by CMT positive samples (Yasar *et al.*, 2009). Moreover, the goats at Mount Kenya region have showed subclinical mastitis with higher prevalence (61%) rate confirmed following CMT results, while it was estimated 57% with culture tests (Mbindyo, *et al.*, 2014).Similarly, higher prevalence of mastitis were noticed in dairy goats by other researchers (Ali *et al.*, 2010 and Contreras *et al.*, 2007). The management practices, agro climatic conditions, resistance of animals and breeds of goats were counted as basis of the significant variation in the prevalence of clinical and subclinical mastitis. Contreras *et al.*,(2007) had observed prevalence of sub clinical mastitis in goats of 5 to 30% after reviewing the results from various researchers. *E. coli and* S. *aureus* were found as causative agent of SCM in the milk samples of small ruminants. The affected animals serves as a reservoir for further propagation of the disease within the herd by sheding the bacteria in milk intermittently. *Staphylococcus aureus* is found an important food borne pathogen and has capability to produce several toxins (Fagundes, *et al.*, 2010). In dairy goats, the prevalence of CM may not exceed 5%, while sub clinical mastitis is found common having 6 times more than clinical affections (Nabih, *et al.*, 2018). Most smallholder farmers are not well notified about the invisible losses from SCM and do not normally recognize the condition. Therefore mastitis affected value chain activities and performance negatively in the region (Mungube, *et al.*, 2004). The incidences of subclinical mastitis also varied between the different states. In China, among the investigated provinces the Yunnan had showed the lowest prevalence rate.

Another investigation was conducted to observe the influence of mastitis that showed a high prevalence rate of subclinical mastitis (33.13%) in comparison with clinical mastitis (3.4%) and the mycotic mastitis in does was recorded 14.54% as 1.74% was clinical form and 12.79% as subclinical mastitis. Higher prevalence of SCM was reported 45% and 53.5% among dairy goats by (Najeeb, *et al.*, 2013 and Ali *et al.*, 2010). In contrast, another researcher stated 22% subclinical mastitis in goats on the premise of microbiological screening and somatic cell count. This stated difference may be due to the investigational plan, goat breeds, housing condition, farming pattern, milking practices and load/type of pathogens found in surrounding environment. Since worldwide subclinical mastitis is regarded to be the major cause of milk losses attributable to udder infections and a source for

transmission of infectious agents from one animal to animal (Mahmood, *et al.,* 1996).

The body temperature of the goats in this experiment was found slightly increased in untreated group. Moreover, it falls down to normal after treatment of different regimes at variable time periods. When the organisms diffuse into the epithelial layer of the duct system of mammary glands it develops clinical infection that resembles streptococcal mastitis of bovine. Moreover, it's happening harmonized in many cases with an elevation of body temperature of the animals followed by the high viable count of *streptococci* per ml. of milk (Pattison *et al.,* 1951). There is a significant increase in heart rate and body temperature. In sub-acute mastitis variable changes in milk can be found without gross appreciable variations in the udder tissue, whereas the chronic mastitis is terminal phase of mastitis, in which the udder tissues becomes hard while supra-mammary lymph nodes becomes palpable. (Radostits, *et al.,* 2007). Consistently the mastitic animals were treated with different antibiotics, where Body temperature (103.4-104.2 0F) and pulse rate (132-140/min) were elevated, whereas respiratory rate was declined to 80-90/min.(Tufani, *et al.,*2009).

A slight increase in the udder circumference of untreated experimental goats was observed in this study. However, the conventional and traditional methods of treatment had produced some reversal effects on this type of morphometric measurement of goat mammary glands. Similarly, high glandular mid-circumference 30.7 and 29.4 cm was noticed in Sahel goats at unilateral and bilateral infections respectively (Abba *et al.,* 2014).

The milk quantity of our experimental goats was found significantly decreased in untreated group. Moreover, the milk quantity was improved in animals treated with conventional and traditional treatments. Constantly, Milk declines by 30% due to mastitis association with tissue damage that brings about decreased milk yield or termination of milk synthesis (Kifaro, *et al.,* 2009). Milk production declines, during presence of bacteria in milk, which can vary from having a few milk lumps to serum with clumps of fibrin in the secretion. (Premlatha, *et al.,* 2001).

The finding of our sensitivity are in relevance with the results of (Sargeant, *et al.,* 2001), they reported that sensitivity estimates for the california mastitis test cut-points were identical to those reported elsewhere on a quarter and animal basis for intra memory infection (IMI) based on bacterial culture. High test sensitivity for identifying an IMI is required when isolating animals to a veterinary hospital due to potential consequences of failing to diagnose an infected animal, particularly goat harboring a major mastitis pathogen. Milk samples from affected quarters of crossbred ewes were collected in sterile vials. After collection the samples were plated onto the MacConkey agar, nutrient agar, and Eosin Methylene Blue agar (Hi-Media, Mumbai, India) and aerobically incubated at 37°C for 24 hrs. The isolated colonies were again cultured on nutrient agar as pure culture and challenged to standard morphological, biochemical tests as stated by (Cowan *et al.,* 1993) to ascertain their identity. The seven isolates were identified as *Staph. aureus*, three as *E.coli*and one as *Streptococcus sp*, (Tufani *et al.,* 2009).

It has been reported that antibacterial like Cloxacilin, Penicillin-G, Amoxicillin, Methicillin and Ampicilin are effective against *Staphylococcus. Aureus*specie given either in parental or intra-mammary route. The steroids acting as anti-inflammatory drugs were used as supportive therapies to prevent the production of inciting molecules (Sudhan *et al.,* 2010). Besides this Vitamin- E, Vitamin- C and Se helps in cure of SCM cases (Srinivasan, *et al.,* 1998). The drying of teats, this method reduces the chances of infection in milk which as growth medium for the multiplication of organisms. Whereas immunostimulants can be used as activator of innate immunity which may helps in *Staph. aureus* mastitis recovery.

In Pakistan ethnoveterinary procedures (EVPs) are very common due to the poor socioeconomic status of the pastoral farmers (Dilshad *et al.,* 2010). The EVPs recorded in this study were being used as treatment and prophylactic measures by the TVHs. Allium sativum L was found the third most frequently used plant against mastitis. Two major objectives in the control of mastitis i.e. the prevention of new clinical cases and reduction in the period of existing infection (Muhammad *et al.,* 2008). The scientific documentation of the use of Turmeric (*Curcuma longa L.)* for treating mastitis cases in this study is supported by the earlier reports of its use in treating subclinical mastitis (Saxena, *et al*., 1995).

## 5. CONCLUSION

This study has revealed that the traditional method of treatment, through different herbs have positive effect on caprine mastitis, but their efficacy is a bit on slow pace in comparison to allopathic mode of treatment. This difference of efficacy between these two prevailing methods of healing might be due to route of administration and processing or refinery of chemicals used. The results of current study suggested that the medicinal plants can also be used effectively at very low cost, but one has to wait a bit more for recovery in this mode of traditional treatment. However conventional

way of treatment can produce quick results if they are used in proper time with recommended dose.

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