

Research article

Efficacy of homeopathic medicine in treatment of teat fibrosis and mastitis in cows**Prabal Chakraborty¹, SKM Azizul Islam^{1#}, Mohammad Ashif Imtiaz¹, Ashish Kumar Mazumder,² AKM Saifuddin¹**¹Department of Physiology, Biochemistry and Pharmacology, Chattogram Veterinary and Animal Sciences University, Khulshi, Chattogram-4225; ²Department of Pharmacology, University of Science and Technology Chittagong, Zakir Hossain Road, Foy's Lake, Khulshi, Chittagong 4202.

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ABSTRACT

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Teat fibrosis, consequence of mastitis is a devastating disease, which causes huge economic losses in dairy industry. The present study aimed to treat fibrosed teat with unconventional medicines: *Silicea 200c* and *Calcarea flour 200c* in dairy cows. A total of 69 lactating cows of variable age, those were suffering from varying degrees of teat fibrosis with ≥ 1 quarter (s) involved were selected randomly from the commercial dairy farms at Karnaphuli upazilla, Chattogram, Bangladesh and continued the study for a period of 6 months from January-June, 2018. Animals were divided into 3 groups, A, B and C equally (n=23), respectively and trial period was persistent for 20-40 days. In group A, 2ml of *Calcarea flour 200c* was mixed with 100ml of luke warm water, then administered orally thrice/day/animal and 30mins later *Silicea 200c* was also administered accordingly for a period of 20 days; in group B, same treatment regime was continued for a period of 40 days while the group C (control) did not receive any treatment (*Silicea 200c* and *Calcarea flour 200c*) for a period of 40 days. In group A, there was no change in fibrosed teat. In group B, on both period of day 30 and day 40, fibrosed teat returned back to non-fibrosed state to ~83% and mastitic milk converted to normal milk to ~83% with concomitant increased milk production through affected teat which is nearly 7times higher as compared to control group ($p < 0.01$). Conclusively, *Silicea 200c* and *Calcarea flour 200c* treatment showed significant reduction of teat fibrosis in mastitic teat along with increase of milk production. Further study is warranted to evaluate clinical recovery of mastitic fibrosed teat with somatic cell count in milk.

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1. INTRODUCTION

Mastitis is a disease that affects a large number of dairy cattle throughout the world. A survey conducted in the major milk-producing countries revealed that 15-20% of the cows were affected from clinical mastitis (Rahman and Islam, 2014). The overall prevalence of mastitis was 19.9% and 44.8% in dry and wet seasons, respectively. The prevalence of mastitis was found higher $p \leq 0.01$ in wet than in dry season. Udder cleanliness, milk yield and peri-parturient diseases significantly ($p \leq 0.01$) increased the risk of mastitis in the dairy farms of Bangladesh (Rahman and Islam, 2014).

Mastitis is recognized as one of the costliest disease all over the world affecting dairy animals and it is a persistent enigmatic problem in high yielding animals for years together. Mastitis when not treated successfully or left uncared will progress to fibrosis. Fibrous tissues proliferate and occupy the place of infected and damaged soft mammary tissues. Formation of fibrous tissue and encircling the pathogen is a defensive mechanism from preventing the spread of pathogen. Thus extensively indurate the udder and teat cisternae

(Chandel et al., 2009). Fibrosis may be diffused, involving whole quarter or local varying in size from pea like lesion to bigger masses near the base or tip of the teat (Blood et al., 2006). Teat fibrosis, a common sequel of mastitis develops so gradually that it may escape observation until most of the secretory tissues are destroyed. Fibrosed mastitic cows do not usually respond to conventional antimicrobial therapy and the affected quarter is ultimately rendered non-functional resulting in a considerable economic loss to cattle owners (Shah et al., 2010).

For over decades, antimicrobials has been used to treat mastitic animals, however, it is a continuous major disease problem of the dairy industry (Smith et al., 1997). Mastitis is the most common reason for antimicrobial use in dairy cows and mastitogen have led to the development of resistance and failure of antimicrobial therapy (Pachauri, 2000). The incidence of contagious mastitis has diminished through the use of antimicrobials, but this has been paralleled by an increase in the level of environmental mastitis,

which might be from metabolic changes during periparturient period.

However, a large number of preventive and curative measures are available for the farmers to deal with the problem. Mastitis control also entails a good understanding of the factors that encourage its incidence and the microorganisms that cause it. The trends necessities are the use of alternative therapy (homeopathy) for the control of mastitis through enhancement of immune system of udder (Pachauri, 2000). Use of homeopathy in mastitic cases, is the great benefit in food producing animals and reduces the antibiotic residue in milk and milk products.

Keeping above facts an earlier study was conducted to evaluate the efficacy of homeopathic drugs (*Silicea 200c* and *Calcari flour 200c*) along with antibiotics to treat the various clinical form of mastitis with teat fibrosis in two groups of cattle and only antibiotic therapy in another group of cattle having similar condition of udder (Chandel et al., 2009). *Calcari flour 200c* is a powerful tissue remedy for hard, stony glands, varicose and enlarged veins, and malnutrition of bones, hard knots in teats. A nodule in the course of a tendon and exostosis, a stony hard gland, bony infiltration in the periosteum, rice bodies in cartilages have been cured by this (Shah et al., 2010). *Silicea 200c* can stimulate the organism to re-absorb fibrotic conditions and scar-tissue, must be used with care, for here it may cause the absorption of scar-tissue, liberate the disease (Chandel et al., 2009). It acts accordingly to organic changes and deep and slow in action.

Considering the above backgrounds, the study was undertaken to test the comparative efficacy of curing activities of fibrosed teat with and without treatment of homeopathic medicines (*Silicea 200c* and *Calcari flour 200c*); evaluating the extent of efficacy of homeopathic treatment in acute and chronic fibrosed mastitic cows.

2. MATERIALS AND METHODS

2.1. Animals, Location and Period of study

Lactating cross-bred dairy cows with fibrosed teat from commercial dairy farmers at Karnaphuli upazilla, Chattogram, Bangladesh formed the subject for this study. It was conducted for a period of 6 months from January 2018 to June 2018.

2.2. Selection of Animals

A list of dairy farms was collected from the Karnaphuli Dairy Farmers Association and visited 50 commercial dairy farms. All animals were stall fed condition. A total of 69 mastitic dairy cows of variable age and lactation were selected. All the animals were treated earlier with conventional allopathic therapy with no improvement. The present study based on the affected quarters, which were characterized by very hard, swollen, cord like appearance inside the teat.

2.3. Selection of drugs

A complex of homeopathic medicine usually were used to treat mastitis in India comprising of *Phytolacca 200c*, *Calcareafluorica 200c*, *Silicea 200c*, *Belladonna 30c*, *Bryonia 30c*, *Arnica 30c*, *Conium 30c*, and *Ipecacuanha 30c* in equal proportion (Chandel et al., 2009). Among these, two types of homeopathic medicine were selected for the present study to treat teat fibrosis with different concentrations (*Silicea 200c* and *Calcarea flour 200c*).

2.4. Categorization of affected quarters and milk nature

On physical examination affected teats were categorized as (i) very hard and swollen inside the teat, (ii) Cord like appearance and softened, (iii) Nodular and hardened inside the teat, Nodular and softened inside the teat, and no abnormality detected (normal). And quality of milk were categorized into 5 categories (i) very watery milk, (ii) moderately watery and granular milk, (iii) watery and normal appearance milk, (iv) moderately dense and normal appearance milk, (v) more dense and bright color (normal). Further the teat nature and quality of milk were broadly classified into two groups viz fibrosed/non-fibrosed teat and mastitic/ normal milk, respectively.

2.5. Grouping of animals

All animals were categorized into 3 groups consisting of equal number in each group (n=23) of animals. Group A: Animals were treated with drugs (*Silicea 200c* and *Calcari flour 200c*) for 20 days; Group B: Animals treated with *Silicea 200c* and *Calcari flour 200c* for 40 days; Group C: Animals remains untreated for 40 days (Control). No supporting therapy except stripping twice daily was given during the course of the treatment.

2.6. Preparation and administration of homeopathic medicine

Two ml of *Calcarea flour 200c* was mixed with 100 ml of luke warm water and same preparative procedure was also followed for *Silicea 200c* too. Both were administered orally thrice/day/animal with half an hour interval.

2.7. Collection of milk and other clinical data

Milk from each affected teat was collected, measured and examined to evaluate milk nature and teat status daily for signs of clinical recovery up to 40 days of treatment and data was recorded in record keeping sheet.

2.8. Economics

In cost analysis, total cost was calculated in Taka and USD per animal. Likely, the cost of *calcari flour 200c* and *Silicea 200c* medicine (containing 500 ml in each bottle) is around \$ 6.25 (TK. 500). So, cost for each ml of medicine is \$ 0.0125 (TK.1). In case of 20 days treatment, daily total

dose required for one animal is (2 ml+ 2 ml+2 ml) 6 ml. So, for 20 days, total dose required is (6x20) 120 ml and total cost is \$1.5 (TK. 120). Again, In case of 40 days treatment, daily total dose required for one animal is (2 ml+ 2 ml+ 2 ml) 6 ml. So, for 40 days, total required dose is (6x40) 240 ml and total cost is \$3 (TK. 240). So, the daily requirement of total medicine is 12 ml (6 ml each item) and total daily cost is about \$0.15 (TK. 12).

2.9. Data entry and analysis

The collected data were entered into the spread sheets of Microsoft Excel-2016. Then data were cleaned, sorted and exported to Statistical Package for Social Sciences (SPSS-16). Descriptive statistical analysis includes percentage, mean, standard deviation, and 95% Confidence interval were performed. To find out differences among groups and between groups, one way ANOVA and simple T-test were performed respectively. p<0.05 was considered the level of significance.

3. RESULTS

In every group, milk production was slowly initiated through the affected teat during the experimental period (Table 1). In case of Group A, it was observed as average milk production was 1.52 ml on day 1 which was increased to 15 ml on day 10 and finally on day 20 it was 25 ml and the production performance was differed significantly (p<.01). In case of Group B, the milk production performance through affected teat was increased slightly better after treatment with both *Silicea 200c* and *Calcarea flour 200c* from 6.96 ml on day 1 to 75.65 ml on day 40 and which were differed significantly among days of production(p<.01). On other side, milk production in control Group C (without treatment of *Silicea 200c* and *Calcarea flour 200c*), there was no significant rise of milk yield which was 0 ml on day 1 to 11.96 ml on day 40 though the production performance was differed significantly (p<.01).

Table 1. Milk production performance among different days of treatment within 3 treatment groups

Treatment Duration (Day)	Group-A		Group-B		Group-C	
	Mean±SD	95% CI	Mean±SD	95% CI	Mean±SD	95% CI
D 1(n=23)	1.52±2.35	0.55~2.54	6.96±2.92	5.69~8.22	.00±.00	.00~.00
D 10(n=23)	15.0±6.22	12.31~17.69	20.44±6.89	17.45~23.42	.87±1.94	.032~1.70
D20(n=23)	25.0±8.53	21.31~28.69	37.17±10.85	32.48~41.87	4.57±1.44	3.94~5.19
D 30(n=23)	N/A	N/A	54.35±15.02	47.85~60.84	8.04±2.5	6.96~9.12
D40(n=23)	N/A	N/A	75.65±22.43	65.95~85.35	11.96±2.92	10.69~13.22
	p = 0.000		p = 0.000		p = 0.000	

Group A, Treated with both *Silicea 200c* and *Calcarea flour 200c* for 20 days;Group B, Treated with both *Silicea 200c* and *Calcarea flour 200c* for 40 days; Group C, Without treatment of *Silicea 200c* and *Calcarea flour 200c* for 40 days; 95% CI (Confidence Interval); Mean±SD (Standard Deviation)

Table 2. Milk Production performance between treatment and control groups during 20 and 40 days treatment

Treatment Duration (Day)	Group-A	Group-C	p	Group-B	Group-C	p
	Mean ± SD (ml)	Mean ± SD (ml)		Mean ± SD (ml)	Mean ± SD (ml)	
D1(n=23)	1.52 ±2.35	.00±.00	.003	6.96±2.92	.00±.00	.000
D10(n=23)	15.00 ±6.23	.87±1.94	.000	20.43±6.89	.87±1.94	.000
D 20(n=23)	25.00 ±8.53	4.57±1.44	.000	37.17±10.85	8.04±2.49	.002
D 30(n=23)	N/A	N/A		54.35±15.02	8.04±2.49	.000
D 40(n=23)	N/A	N/A		75.65±22.43	11.96±2.92	.000

Group A, Treated with both *Silicea 200c* and *Calcarea flour 200c* for 20 days;Group B, Treated with both *Silicea 200c* and *Calcarea flour200c* for 40 days;GroupC, Without treatment of *Silicea 200c* and *Calcarea flour 200c* for 40 days;Mean±SD (Standard Deviation);N/A, Not applicable, *(p<.05)

During 20 days treatment period, milk production performance through affected teat between treated and control (untreated) group on same day shows significant variation. The average milk production on day 1 was 1.52 ml vs .00ml, p<.05; on day 10 was 15 ml vs .87ml, p<.01; on day 20 was 25ml vs 4.57ml, p<.01, respectively.

Average milk production between treated and untreated group during 40 days of treatment revealed that on day 1 the mean milk production was 6.96 ml vs .00 ml, p<.01; on day 10 was 20.43 ml vs .87 ml, p<.01; on day 20 was 37.17 ml vs 8.04 ml, p<.05; on day 30 was 54.35 ml vs

8.04 ml, $p < .01$ and on day 40 was 75.65 ml vs 11.96 ml, $p < .01$, consecutively (Table 2).

Pattern of changing fibrosed to non-fibrosed teat and mastitic to normal milk with or without *Silicea 200c* and *Calcarea flour 200c* treatment during experimental period is shown in table 3. Considering the nature of teat in group-A, all teats remained in fibrosed state, in group-B, teat started

to be converted from fibrosed state to non-fibrosed state; on 30 day (13%) and on 40 day (82.6%), respectively. And in group C, all treated teats remained fibrotic state. While considering the nature of milk, in group A found all milks remained mastitic, in group-B, milk became in normal state on day 30 (26.1%) and on day 40 (82.6%), respectively. And in group C, all milk remained mastitic.

Table 3. Changing pattern of fibrosed teat to non-fibrosed teat and mastitic to normal during 20 day(s) and 40 day(s) of treatment with or without *Silicea 200c* and *Calcarea flour 200c*

Parameters	Group	Category	Treatment Duration				
			Day 1	Day 10	Day 20	Day 30	Day 40
Nature of teat	A(n=23)	Fibrosed	100	100	100	N/A	N/A
		Non- Fibrosed	-	-	-	N/A	N/A
	B(n=23)	Fibrosed	100	100	100	87	17.3
		Non- Fibrosed	-	-	-	13	82.6
	C(n=23)	Fibrosed	100	100	100	100	100
		Non- Fibrosed	-	-	-	-	-
Nature of milk	A(n=23)	Mastitic	100	100	100	N/A	N/A
		Normal	-	-	-	N/A	N/A
	B(n=23)	Mastitic	100	100	95.7	73.9	17.3
		Normal	-	-	4.3	26.1	82.6
	C(n=23)	Mastitic	100	100	100	100	100
		Normal	-	-	-	-	-

Group A, Treated with both *Silicea 200c* and *Calcarea flour 200c* for 20 days; Group B, Treated with both *Silicea 200c* and *Calcarea flour 200c* for 40 days; Group C, Without treatment of *Silicea 200c* and *Calcarea flour 200c* for 40 days; N/A, Not applicable

Table 4. Changing pattern of Fibrosed teat to Non-fibrosed teat status during 40 day(s) of treatment with *Silicea 200c* and *Calcarea flour 200c*

Duration of treatment	Condition of teat status			p	Nature of milk		
	Fibrosed teat	Non- fibrosed teat			Mastitic	Normal	p
(Day)	(n, %)	(n, %)		(n, %)	(n, %)		
30	87	13	.000	73.9	17.3	.000	
40	17.3	82.6		26.1	82.6		

Pattern of changing fibrosed to non-fibrosed teat with or without *Silicea 200c* and *Calcarea flour 200c* treatment during 40 days period is shown in table 4. On day 30, 87% teats found in fibrosed state whereas on day 40 almost 83% teats were found in non-fibrotic state. The cure rate of teat from fibrosed state to non-fibrosed state was differed significantly between day 30 and day 40 of treatment ($p < .05$). On 30 day of treatment, 73.9 % cases found as mastitic milk and 17.3 % cases recovered as normal milk. Similarly on 40 day,

26.1% cases remained as mastitic milk and 82.6 % cases recovered as normal milk, respectively. Outcomes of treatment with *Silicea 200c* and *Calcarea flour 200c* during 40 days period is shown in table 5. In fibrosed teat, 03 cases found cured (13.04 %) on day 30 and 19 cases found cured (82.61 %) on day 40, consecutively. In case of mastitic milk, 06 cases found cured (26.09%) on day 20 and 19 cases found cured (82.61 %) on day 40, respectively.

Table 5. Treatment outcomes

Udder diseases	Recovery Rate (n, %)	
	Day 30	Day 40
Fibrosed teat	3,13.04	19,82.61
Mastitic milk	6,26.09	19,82.61

4. DISCUSSION

The findings of the present study revealed as a promising response in the treatment of teat fibrosis and mastitic milk in lactating commercial dairy cows. Previous study showed variable results in the management of mastitic dairy cows with single homeopathic medicine worldwide (Upadhyay and Sharma, 1999). It has been

suggested to use of complex medicines for safe and quick recovery and this type of approach of rearing husbandry and treatment has been commercially popular in many European countries and India (Rastogi et al., 2015).

Such type of research yet has not been reported in Bangladesh. Our findings regarding the recovery of the fibrosed teats of the cows with homeopathic medicine are in agreement with earlier

observations of 70-80% cure rate in fibrotic mastitis in cows (Shah et al., 2010). Comparative efficacy of homeopathic and allopathic treatment is found significant in the management of clinical mastitis of crossbred dairy cows (Chandel et al., 2009). It is hopeful that the present study results are interesting because there is hardly any treatment for the management of fibrosed mammary gland except surgery. Limited researches are available on the use of homeopathic drugs in the management of teat fibrosis in Bangladesh.

Fibrosis occurs when immune cells specially macrophages initiated release of soluble factors that stimulate fibroblasts, which deposit extracellular matrix into the surrounding connective tissue. Recent studies show that epigenetic mechanisms, long non-coding RNAs, may also regulate the fibrosis process (Saayman et al., 2016). Regeneration of fibrous tissue to non-fibrous tissue caused from apoptosis of some myofibroblasts and some of myofibroblasts were reverting to quiescent hepatic stellate cells (Kisseleva et al., 2012).

In the present study, the lactating dairy cows with teat fibrosis treated with both *Silicea 200c* and *Calcareaflour 200c* for a period of 40 days recovered from fibrotic teat state to non-fibrotic teat state that peaked at 83%, which echoes with earlier study (Varshney and Naresh, 2004). The animals with a complex of homeopathy comprising of *Phytolacca 200c*, *Calcareaflurica 200c*, *Silicea 30c*, *Belladonna 30c*, *Bryonia 30c*, *Arnica 30c*, *Conium30c*, and *Ipecacuanha 30c* in equal proportion that shows recovery rate 80% with the recovery period 21-42 days (Upadhyay and Sharma, 1999). In the present study recovery rate was getting higher with the increasing of treatment duration from 30 to 40 days of treatment and there was not shown any sign of recovery on < 30 days of treatment. This recovery rate from fibrosed teat to normal teat reflected by stripping of milk yield at higher percentage (83%) through afflicted teat on day 40 as compared to on day 30 that differed significantly ($p < .05$). In control group without treatment with *Silicea 200c* and *Calcareaflour 200c*, although showed increased milk yield with the advancement of treatment period that is on day 40, almost 7 times less than the treated one. In untreated cows, the milk production also increased that could be due to the regular stripping of milk through affected teat. The combined homeopathic drugs possess different mode of action viz. *Phytolacca* and *Belladonna* act as anti-inflammatory; *Silicea 200c* shows absorptive effect on fibrotic and scar tissue; *Arnica* act as anti-haemorrhagic and antiseptic effect and *Ipecacuanha* and *Calcareaflurica* act as local decongestive (William, 1999).

The present study is an observational study, where no laboratory study was conducted to diagnose the mastitic case through somatic cell count; assessed the nature of teat and milk quality through palpation of teat by physical estimation. However,

the result suggests that combined homeopathic treatment with *Silicea 200c* and *Calcareaflour 200c* to treat teat fibrosis is promising since higher recovery rate along with increase milk production through affected teat and cost effective as compared to allopathic treatment with conventional antimicrobial drugs that do not recover fibrotic state of teat.

In summary, treatment with *Silicea 200c* and *Calcarea flour 200c* revealed that 13.04 % fibrosed teat found recovered on day 30 and 82.61 % found on day 40, respectively. In case of mastitic milk 26.09% cases found cured on day 20 and 82.61 % on day 40, consecutively. Fibrosed teat was going to recover again to their normal state and concomitant increased milk production through affected teat is found at almost 7 times higher as compared to control animal. Overall, this study provides a clear concept about the economic and effective treatment through using the unconventional homeopathic medicines against mastitis and teat fibrosis in commercial dairy farming. Further study is warranted with more laboratory study such as somatic cell count, assessing biochemical parameters, ultrasonography of affected teat to assess the sign of recovery and cost benefit analysis of the treatment cost and milk production in subsequent lactation.

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