

Changes of Vaginal pH With *Vengaaraneer* Douche in *Kabayonirogam* (Vulvovaginal Candidiasis)

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ABSTRACT

BACKGROUND: *Kabayonirogam* which is symptomatically similar with vulvovaginal candidiasis (VVC) is one of the most common vaginal infections in women. Despite advances in antifungal therapies in conventional management, there is a need for affordable alternative health care, particularly in case of recurrent VVC. Mechanisms by which asymptomatic colonization converts to symptomatic disease and recurrences were studied elaborately by many authors. The ability of switching between yeast and hyphae in response to environmental cues particularly pH changes is thought to be associated with virulence. This study investigates the effect of changes in pH by treatment with *Vengaaraneer* douche in VVC patients. The aim of the current study is to monitor the changes in pH before and after application of *vengaaraneer* douche in VVC patients. **METHODS:** Ten positive VVC patients were enrolled for study. Vaginal swabs were collected for the presence of *Candida albicans* in microbiology department by using Gram's staining, and to evaluate the pH. **RESULTS:** The results were statistically evaluated by paired t test, SPSS software. **CONCLUSION:** The morphological transition necessary for the virulence of *Candida albicans* more in the neutral and alkaline pH. As per results there is high significance of *vengaaraneer* douching influencing the pH of the vaginal environment by reducing the pH which may reduce virulence as the transition is dependent on the ability of the *Candida albicans* to change the pH. This is only a pilot study; more detailed study is required to establish the effect of *vengaaraneer* on pH modulation.

KEY WORDS: *Candida albicans*, pH, Siddha Douche, Virulence, *Vengaaraneer*.

1. INTRODUCTION

Vulvovaginal candidiasis (VVC) which is symptomatically similar with *Kabayonirogam*^[1] of Siddha diagnosis is one of the most common genital infections in human. Most of the vulvovaginal infections are caused by the *Candida* species and 80% of all yeast infections are due to *Candida albicans*. *C. albicans* is an opportunistic fungal infection which is a commensal affecting most women at some point over the course of their lives. This causes superficial mucosal infection in healthy individuals and invasive disease in vulnerable group of patients^[2]. In typical cases, the symptoms include vulval erythema, edema, excoriations, and curdy white discharge^[3]

which are very similar to symptoms of *Kabayonirogam*. Infectious microorganisms need to adopt and respond to host microenvironment for infection. *C. albicans* has a remarkable ability to respond and adapt to a multitude of environmental signals^[4]. This ability of *C. albicans* is supported by a wide range of virulence factors and fitness attributes. Among these various attributes, pH of the vaginal environment is more important in deciding the transition and virulence of this dimorphic fungus. It is found that hyphal growth was antagonized by low pH conditions by many earlier investigations. The wide range of pH values in which *C. albicans* can grow has

prompted numerous studies on how this species adapts to such extreme conditions. But no study has been conducted with *vengaaraneer* douche. Since hyphal transition is more virulent and symptomatic which is pH dependent, we employed the administration of *vengaaraneer* as a tool to study the change in the pH. In this work, we set out to determine whether *vengaaraneer* douching changes the pH of the vaginal local environment. In addition to the study of newer antimycotic agents, new strategies of therapy are required and must be individualized for patients with vulvovaginal candidiasis. Despite these advancements, VVC treatment has become a great challenge due to the pathogen's adaptive nature and failure of conventional therapies. These problems persist despite the availability of potent azole antifungal drugs that are used topically or orally. Because conventional therapies are not always successful, physicians and patients seek alternatives that might be effective in the face of therapeutic failure or that are less costly than commercial antifungal drugs^[5]. Among commonly mentioned alternative systems, Siddha system has effective remedies for different disease conditions including genital infections, *Vengaaraneer* douche is one such remedy^[6]. There is lack of information about its intrinsic pH modifying properties; hence this study intends to evaluate the changes in the vaginal pH of *kabayaonirogam* patients (VVC) patients by *vengaaraneer* douche. The availability and the relatively low cost of the compound suggest to us that this study is a timely undertaking. This study is a first of its kind as this is done in human subjects with an intervention which is indicated in Siddha texts for vaginal diseases (*Yonirogams*)^[7].

2. MATERIALS AND METHODS

This open label nonrandomized pilot study was conducted at AAGHIM, Chennai,

Tamilnadu. The study protocol and informed consent were reviewed and approved by institutional ethical committee. Female attending the OPD who complained of abnormal vaginal discharge, pain abdomen, low back ache and itching in vagina were screened for vulvovaginal candidiasis. General and gynecological examinations were done to evaluate the reproductive health.

2.1 Inclusion criteria: 1. Female of age between 18 to 45 years. 2. Positive candidiasis.

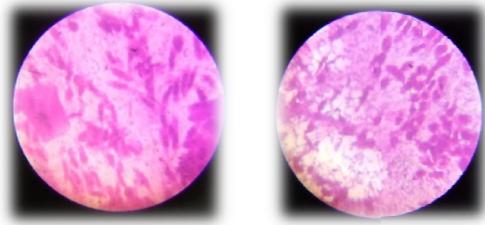
2.2 Exclusion criteria: 1. Known case of STD. 2. Known case of malignancy. 3. Patients who are taking antibiotics / antifungal medication (internal and external).

Women who met eligibility criteria were enrolled for the study. Documented informed consent was obtained from all subjects prior to participation in this study. All subjects were treated for a one week. Each patient underwent entry visit, second visit after one week of douching, third visit for follow up.

2.3 Sample collection and microscopic examination

Samples are collected from patients who are entering in to eligible criteria. Vaginal swabs were collected from the lateral wall of vagina. One cotton swab was placed in a test tube which contains 1 ml of sterile saline and taken to microbiology laboratory, Government siddha medical college, Arumbakkam, Chennai, to be evaluated microscopically for the presence of candida species. Second cotton swab was used to determine the pH by using a pH paper with a range from 1 to 14. The color changes in pH paper was compared with pH paper chart and recorded. pH of the vagina is monitored before and after the intervention.

Figure.1 Positive *C.albicans* in Gram stain



3.RESULTS

32 patients who came to the outpatient department of Government Siddha Medical College, AAGHIM who presented with the Symptoms of vaginal discharge were screened. Out of them, ten patients were *Candida albicans* positive on microbiological examination (fig.1). These ten patients were enrolled and administered *vengaaraneer* douche for one week. Their vaginal pH before and after treatment were recorded. Nearly in all patients, pH is reduced and was relieved with symptoms. The results were shown in the table.(Table.1)

Table.1Vaginal pH before and after treatment with *vengaaraneer* douche

SN	Op no	Age	Vaginal pH	
			BT	AT
1.	4360	30	6	4
2.	4578	40	7	4.5
3.	4859	31	6	3.5
4.	7234	32	6.5	4
5.	60	23	4	4
6.	2779	38	7	4.5
7.	832	28	8	4.5
8.	3135	19	8	4.5
9.	7233	34	6	4
10.	1260	41	7	4

BT- Before treatment, AT- After treatment

Table. 2Paired sample t- test analysis

Pair	Mean	SD	SEM	Paired Differences		T	Df	Sig. (2-tailed)
				95% Confidence Interval of the Difference				
				Lower	Upper			
1 - VAR00001 VAR00002	2.40000	.99443	.31447	1.68863	3.11137	7.632	9	.000032

Df – Degree of freedom, Sig – Significance ,N – Number of samples, SD- standard deviation, SEM- standard error of the mean

3.1 Statistical analysis

3.1.1 Null Hypothesis (H₀) - There is no significant changes in pH, before and after intervention.

3.1.2 Alternative Hypothesis (H₁)- There is significant changes in pH, before and after intervention.

Since p value is less than 0.01(0.00032), null hypothesis is rejected at 1% level of significance. Hence there is highly significant difference in pH before and after treatment^[8].

4. DISCUSSION

Vaginal pH in the context of health is low (<4.5); however, unlike other forms of vaginitis, VVC is not associated with alkalization of the vagina, and diagnostically, an acidic vaginal pH is consistent with VVC.^[1] *Candida albicans* behaviors are affected by pH, an important environmental variable. Filamentous growth is a pH-responsive behavior, where alkaline conditions favor hyphal growth and acid conditions favor growth as yeast.^[9] Most of the earlier works were conducted invitro and rat models. This study is a first of its kind as this is done in human subjects with an intervention which is indicated in Siddha texts for vaginal diseases (*Yonirogams*).

C. albicans has a uniquely intimate association with the mammalian host amongst fungi and the virulence in these species appears to be the result of a gradual adaptation of common aspects of fungal physiology to the host environment rather than the acquisition of specific virulence factors such as toxins or secondary metabolites. It is found that hyphal growth was antagonized by low pH conditions by many earlier investigations. The wide range of pH values in which *C. albicans* can grow has prompted numerous studies on how this species adapts to such extreme conditions. But no study has been conducted with *vengaaraneer* douche, since hyphal transition is more virulent and symptomatic, we employed the administration of *vengaaraneer* as a tool to study the change in the pH. In this study it is noted that nearly in all the cases, after *vengaaraneer* douching for one week, the pH reduced and came to 4 to 5. It was evident that most of the positive VVC cases

during the enrollment had neutral pH and were symptomatic. Neutral pH has been long recognized as an inducer of hyphal-morphogenesis and cells in alkalizing media shift to the hyphal form as *C. albicans* effectively auto induces morphogenesis and switches to hyphal form. The ability to control extracellular pH by *Candida* species may be an evolutionary adaptation and the *vengaaraneer* douching interrupts this ability by some complex way. This pH reversing effect, blocks the transition and virulence of *c. albicans* in the host which may be an effective way to treat the disease. Our findings link these phenomena, as the extracellular pH is modified with the administration of *vengaaraneer* douche.

5. CONCLUSION

Vengaaraneer douching reduces vaginal pH to normal acidic level whereby reducing the virulence and symptoms. This will help further studies which may explore the intervention's efficacy to interfere with the virulence of *Candida albicans*. We suggest that the role of *vengaaraneer* douche in modifying vaginal pH merits further study.

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