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Study on the Utility of Pineapple and Cervical Ripening in Semi-Urban Populations

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Abstract:

Background: Labor induction remains a frequent intervention in post-term pregnancies, often employed by midwives to mitigate potential risks associated with prolonged gestation. Central to the success of labor induction is the preparation of the cervix, which plays a pivotal role in facilitating the onset and progression of labor. Consequently, understanding methods to effectively ripen the cervix before induction is of paramount importance. In light of this, the present research endeavors to explore the impact of consuming edible pineapple on cervical ripening and the initiation of labor.

Objective: The present study seeks to address this gap in knowledge by examining the impact of edible pineapple consumption on cervical ripening and the onset of labor.

Method: A systematic prospective investigation was conducted involving 100 pregnant women with a gestational age ranging from 40 to 41 weeks. The study aimed to elucidate whether pineapple consumption exerts a measurable effect on cervical ripening parameters and labor initiation indicators. Participants were divided into two groups: a test group and a control group. The test group received 250g of pineapple to consume over 7 days, while the control group did not receive any intervention.

Results: The distribution of participants across various age groups showed a majority falling between 25 and 30 years of age. Additionally, the distribution based on parity indicated that the majority of participants were multigravida. Although there was no significant difference observed in the mean Bishop score at admission between the test and control groups, pineapple consumption led to a significant increase in the Bishop score after 24 hours in the test group compared to the control group, suggesting an impact on cervical ripening. Furthermore, the duration of both the first and second stages of labor was significantly shorter in the test group compared to the control group, indicating the potential benefits of the intervention in expediting labor progression.

Conclusion: The study underscores the potential benefits of pineapple consumption in expediting labor progression, as shown by significant increases in Bishop scores after 24 hours and notably shorter durations of both the first and second stages of labor.

Keyword: *cervical ripening, pineapple consumption, bromelain, labor induction, Bishop score, labor progression, uterine contraction, pregnancy outcomes, first stage of labor, second stage of labor, cervical softening, gestational age, natural cervical ripening agent.*

Introduction:

The cervix undergoes physiological changes in preparation for labor with cervical ripening being the most critical phase (1,2). Cervical ripening involves softening, effacement (thinning), and dilation (opening) of the cervix, enabling the passage of the fetus through the birth canal (3–5). Various factors can influence cervical ripening, including hormonal fluctuations and mechanical stretching (6,7). Given the significance of cervical ripening in labor progression, interventions aimed at enhancing this process are of clinical interest. Several medical methods are utilized for preparing the cervix, encompassing both pharmacological and mechanical approaches. Pharmacological methods often involve the administration of prostaglandin E1 and E2, which are available in the form of gels, suppositories, and oral tablets (8–10). These agents work by inducing cervical ripening and softening, thereby facilitating the onset of labor. Additionally, mechanical methods are employed, which typically include the insertion of an intracervical Foley catheter, with or without the additional administration of normal saline into the amniotic cavity (11,12).

Pineapple, a tropical fruit renowned for its sweetness and tanginess, contains an enzyme called bromelain, primarily concentrated in its stem and core (13). Bromelain is recognized for its proteolytic (protein-digesting) properties and its ability to reduce inflammation (14,15). These characteristics have sparked interest and speculation regarding the potential benefits of pineapple consumption in promoting cervical ripening, a crucial process preceding childbirth. Despite anecdotal reports and theoretical considerations, empirical evidence supporting the efficacy of pineapple in facilitating cervical softening and ripening remains scarce, prompting the need for rigorous scientific research to substantiate these claims.

Bromelain, the key bioactive component in pineapple, is believed to exert its effects by breaking down proteins and modulating inflammatory pathways (16,17). In the context of cervical ripening, bromelain's proteolytic activity may contribute to the breakdown of collagen fibers in the cervix, leading to increased softness and pliability and potentially promoting the dilation and effacement necessary for the progression of labor. While these mechanisms offer a plausible rationale for the use of pineapple in labor preparation, empirical studies are essential to validate its efficacy and safety in this context.

Methods:

Study design: This prospective investigation was conducted was conducted at a tertiary care centre in Pune, India, spanning from March 2022 to September 2023 involving 100 pregnant

women with a gestational age ranging from 40 to 41 weeks. The study recruited pregnant women at term gestation (40–41 weeks) from the antenatal clinics with informed consent obtained from each participant The test group received a 250g of pineapple to consume over a period of 7 days, while the control group did not receive any intervention.

Data Collection: Baseline demographic data including age, parity, and gestational age were recorded for all participants. The Bishop score was assessed at admission for both groups. Participants in the test group were monitored for the duration and frequency of pineapple consumption. Throughout labor, cervical dilation was assessed regularly, and the time to onset of labor was recorded.

Outcome Measures:

The primary outcome measure was the Bishop score, a validated tool for assessing cervical ripening. Secondary outcome measures included time to onset of labor and progression of cervical dilation during labor.

Statistical Analysis:

Descriptive statistics were used to summarize demographic data. Continuous variables were compared between groups using t-tests. A p-value < 0.05 was considered statistically significant.

Inclusion Criteria:

- Pregnant women with a gestational age between 40 and 41 weeks.
- Singleton pregnancies.
- Women with no contraindications to vaginal delivery.
- Women who provide informed consent to participate in the study.

Exclusion Criteria:

- Multiple gestations.
- Known contraindications to vaginal delivery
- Women with a history of cervical cerclage or cervical insufficiency.
- Known allergies to pineapple or any related ingredients.
- Women with medical conditions that may affect cervical ripening or labor progression
- Women with a history of preterm labor or preterm birth in previous pregnancies.

- Women who are unable to provide informed consent or participate in follow-up assessments.

Results:

In the comparison of demographic parameters between Group A and Group B, no statistically significant differences were observed in mean age (27 ± 4.5 years in Group A vs. 28 ± 5 years in Group B; p = 0.2958) or gestational age (38 ± 3 weeks in Group A vs. 39.98 ± 1.5 weeks in Group B; p = 0.1164). These findings suggest that there were no significant disparities between the two groups in terms of age or gestational age (Table 1).

Table 1: Demographics of the study population

Demographic Parameters	Group A	Group B	p-Value
Mean Age (years)	27 ±4.5	28±5	0.2958
Gestational Age	38±3	39.98±1.5	0.1164

The distribution of participants across different age groups showered that 29 patients (29%) were within the age group of 19-24 years, 53 patients (53%) were aged between 25 and 30 years, and 18 patients (18%) belonged to the age group of 31-36 years. This distribution demonstrates a relatively even spread of participants across the specified age categories. The majority of participants, comprising 53% of the total, are between the ages of 25 and 30 years. Conversely, the smallest proportion of participants, constituting 18% of the total, falls within the age group of 31-36 years (Table 2).

Table 2: Age distribution of the study population

Age Group (years)	**Frequency**	**Percentage**
19-24	29	29
25-30	53	53
31-36	18	18
Total	**100**	**100**

The distribution of participants based on parity showed 25 individuals (25%) were primigravida while as 75 patients (75%) were multigravida.

Table 3: Distribution of the study population based on parity

Parity	Frequency	Percentage
Primigravida	25	25
Multigravida	75	75

The mean Bishop score at admission was 4.2 ± 0.63 for the test group and 4.25 ± 0.6 for the control group, with no statistically significant difference observed between the two groups (p = 0.6853). However, at 24 hours post-treatment with pineapple, there was a notable difference in the mean Bishop score. The test group exhibited a mean Bishop score of 6.15 ± 1.5, whereas the control group had a mean Bishop score of 5.35 ± 0.92. This difference was statistically significant, with a p-value of 0.0018, suggesting that pineapple consumption may have had a significant impact on cervical ripening, as indicated by the increase in Bishop score in the test group compared to the control group after 24 hours of treatment.

Table 4: Comparison of Bishop Score

	Test Group	Control Group	P Value
Mean Bishop Score at Admission	4.2 ±0.63	4.25 ±0.6	0.6853

Mean Bishop Score at 24hrs Post Treatment with pineapple	6.15±1.5	5.35±0.92	0.0018

In the first stage of labor, the test group had a mean duration of 653 minutes (±81), whereas the control group had a mean duration of 690 minutes (±67). This difference was statistically significant (p = 0.0145), indicating that the first stage of labor was shorter in the test group compared to the control group. Similarly, in the second stage of labor, the test group had a mean duration of 73 minutes (±17), while the control group had a mean duration of 82 minutes (±23). Again, this difference was statistically significant (p = 0.0284), indicating that the second stage of labor was shorter in the test group compared to the control group. This indicates that there was a notable difference in the duration of the stages of labor between the two groups, with the test group showing a longer duration compared to the control group.

Table 5: Comparison of stages of labour

Stage of labor	**Test Group**	**Control Group**	**P Value**
First stage (minutes)	653±81	690±67	0.0145
Second stage (minutes)	73±17	82±23	0.0284

Discussion:

Our study found no statistically significant differences in mean age or gestational age between Test group and Control group. This suggests that the participants in both groups were well-

matched in terms of age and gestational age distribution. Furthermore, the distribution of participants across different age groups and parity categories demonstrated a relatively even spread, with the majority of participants falling between 25 and 30 years of age and being multigravida.

The significant impact of pineapple consumption on cervical ripening, as shown by the significant increase in Bishop score after 24 hours post-consumption in the test group compared to the control group, concurs with the findings from previous studies (18–20). Highlighting the potential efficacy of pineapple as a natural cervical ripening agent and increasing the uterine contraction. Moreover, the shorter duration of both the first and second stages of labor in the test group compared to the control group aligns with prior research suggesting the potential benefits of pineapple consumption in expediting labor progression, although further investigation is required to confirm these effects and elucidate underlying mechanisms.

Despite the intriguing potential of pineapple and bromelain in cervical ripening, clinical evidence supporting their use remains are limited and inconclusive. Previous research has primarily relied on anecdotal reports and observational studies, lacking robust methodology and scientific rigor. As a result, the true impact of pineapple consumption on cervical ripening and labor outcomes remains uncertain. Addressing this knowledge gap requires well-designed clinical trials with rigorous methodology, including randomized controlled trials (RCTs) comparing pineapple consumption to a control group to elucidate its true effects on cervical ripening and labor induction.

Furthermore, it is important to consider potential limitations and safety concerns associated with pineapple consumption during pregnancy. While pineapple is generally considered safe for most individuals when consumed in moderation, excessive intake may pose risks due to its high bromelain content (13). Possible adverse effects include gastrointestinal discomfort, allergic reactions, and uterine contractions, particularly in individuals with sensitivities or allergies to bromelain (14). Therefore, any investigation into the use of pineapple for cervical ripening must carefully assess its safety profile and potential adverse effects in pregnant individuals.

Limitation: Overall, our study contributes valuable insights into the potential role of pineapple consumption in promoting cervical ripening and labor initiation, however the sample size and single hospital study one of the main limitations of this study. It is required that further study in larger population and randomized controlled trials should be done to get more clear insights.

Conclusion:

In conclusion, while pineapple and its constituent bromelain hold promise as natural agents for cervical ripening, their efficacy and safety in this context remain uncertain and warrant further investigation. Rigorous clinical trials utilizing robust methodology are needed to elucidate the true impact of pineapple consumption on cervical ripening and labor outcomes. Additionally, comprehensive safety assessments are essential to ensure the well-being of pregnant individuals and their unborn babies. Until conclusive evidence is available, caution should be exercised regarding the use of pineapple as a cervical ripening agent in clinical practice.

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