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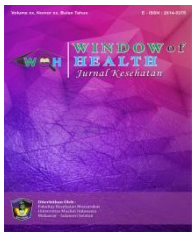

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Comparison of the Effectiveness of Date Fruit Consumption and Oxytocin Massage on Uterine Involution in Postpartum

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ABSTRACT

Postpartum hemorrhage remains a major global health problem and a leading cause of maternal mortality. Effective uterine involution, supported by uterine contractions and the hormone oxytocin, plays a crucial role in preventing hemorrhage. In addition to pharmacological methods, oxytocin stimulation can be achieved non-pharmacologically through oxytocin massage and nutritional support, such as the consumption of date fruit. These two interventions operate through distinct yet complementary mechanisms: neuroendocrine stimulation and metabolic nutritional support. This study aimed to compare the effectiveness of date fruit consumption and oxytocin massage on uterine involution among postpartum mothers. A quasi-experimental pre-test–post-test design was used, with 30 postpartum mothers purposively selected and divided into two groups. The first group consumed 100 g of dates daily, while the second group received oxytocin massage once a day, both for seven days. The results showed that the average reduction in uterine fundal height was 10.47 cm in the date consumption group and 8.07 cm in the oxytocin massage group. An independent t-test confirmed that date consumption was more effective than oxytocin massage at accelerating the reduction in uterine fundal height (p=0.01). Although these findings are limited by the small sample size and purposive sampling method, clinically, both interventions show potential as feasible, low-cost, and culturally acceptable supportive strategies in postpartum care, particularly in resource-limited settings. Further studies with larger samples and more rigorous designs are needed to confirm these results.

Keywords: Uterine involution; oxytocin massage; dates.

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INTRODUCTION

One way to evaluate the level of health in a country is to use Maternal Mortality Rate (MMR). According to the Population and Housing Census (SUPAS) survey in 2015, the Maternal Mortality Rate (MMR) in Indonesia reached 305 per 100,000 live births, which is relatively high compared to other countries in the ASEAN region. This situation demands collective efforts to continually reduce the MMR in Indonesia in line with the targets set in the Sustainable Development Goals (SDGs) for 2030, aiming for an MMR of 70 per 100,000 live births. Maternal deaths can be attributed to two main factors: medical and non-medical. According to the 2021 Health Profile, some medically related causes of maternal mortality include bleeding, hypertension during pregnancy, infections, non-obstetric complications, abortion, and additional factors such as COVID-19 during the pandemic[1,2].

The target for reducing the Maternal Mortality Rate (MMR) in Indonesia has been set at 183 per 100,000 live births, a decrease from the previous figure of 305. In 2022, the national MMR was recorded at 189 per 100,000 live births, with Central Java Province contributing 84.6 of these cases. The postpartum period is the most vulnerable, accounting for 50.7% of all maternal deaths. The leading direct causes of maternal death are hypertensive disorders in pregnancy (33.1%) and obstetric hemorrhage (27.03%), followed by non-obstetric complications (15.7%), other obstetric complications (12.04%), infections (6.06%), and other factors (4.81%). This analysis indicates that preventing maternal mortality requires healthcare services with optimal coverage and quality[3]. Globally, postpartum hemorrhage (PPH) remains a leading cause of maternal mortality, estimated to be responsible for approximately 27% of all maternal deaths. This condition is often associated with failure of uterine involution (subinvolution or atony), where the uterus does not contract effectively after childbirth, failing to constrict the placental blood vessels and leading to life-threatening bleeding[4]. Uterine involution is a critical physiological process for the uterus to return to its pre-pregnancy size. This process is essential in reducing the risk of PPH, as delayed or suboptimal uterine involution is directly linked to an increased risk of dangerous hemorrhage [5]. Although long-term evidence on the impact of PPH on overall mortality varies, and large longitudinal studies show a strong association with short-term morbidity and mortality, PPH is consistently recognized as a major cause of maternal death in many countries [6]. Therefore, the effectiveness of the uterine involution process is a determining physiological factor in strategies to reduce the risk of hemorrhagic complications and maternal mortality.

Optimal care during the third and fourth stages of labor is a key preventive measure against emergency postpartum complications. Central to this is the administration of pharmacological oxytocin in the active management of the third stage of labor, which helps prevent hemorrhage by enhancing uterine contractions, aiding placental expulsion, and facilitating placental separation and uterine involution[7]. The success of this pharmacological strategy underscores the hormone's fundamental role; however, its necessity also highlights a clinical rationale for exploring complementary, non-pharmacological methods to stimulate endogenous oxytocin release.

Consequently, there is growing interest in non-pharmacological interventions that leverage the body's intrinsic physiological pathways. These approaches aim to elicit a similar uterotonic effect by promoting the natural secretion of oxytocin. Two such promising strategies are oxytocin massage and specific nutritional support, such as the consumption of date fruit (Phoenix dactylifera L.). These methods offer potential as accessible, low-cost adjuncts or alternatives to pharmacological agents, particularly in resource-limited settings or for patients with specific care preferences.

Among these, oxytocin massage is a tactile intervention typically administered to the lower back. Its mechanism is grounded in sensory stimulation, which is known to modulate neuroendocrine pathways, thereby promoting endogenous oxytocin release [7]. This release enhances uterine contractility, expedites involution, reduces postpartum bleeding, and can support lactation. Mechanistic studies affirm that such manual stimulation improves uterine tone and reduces the risk of postpartum hemorrhage, supporting its integration into postpartum care protocols.

Similarly, nutritional intervention through date fruit consumption has been proposed to support postpartum recovery. Beyond general nutritional value, dates contain bioactive compounds, including various polyphenols, flavonoids, and sugars like fructose, which may contribute to uterine health [8,9]. The proposed mechanism is multifactorial: the fruit's high energy density may support overall maternal recovery, while specific components might influence prostaglandin synthesis or provide antioxidant effects that aid tissue repair [10 11]. This biochemical rationale, supported by emerging phytochemical and nutritional analyses, positions date consumption as a metabolically supportive intervention for uterine involution.

Given the distinct yet complementary mechanisms of these two non-pharmacological strategies, one primarily neuroendocrine and the other metabolic and nutritional, this study aimed to compare their effectiveness in promoting uterine involution among postpartum mothers. Previous studies have reported the benefits of oxytocin massage and date fruit consumption in supporting postpartum uterine involution; however, these interventions have generally been examined separately. Direct comparative evidence between nutritional-based and tactile-based non-pharmacological strategies remains limited, particularly in postpartum care settings. The novelty of this study lies in its direct comparison of date fruit consumption and oxytocin massage within the same study design, allowing for a clearer evaluation of their relative effectiveness in accelerating uterine involution.

METHOD

This study employed a quasi-experimental design with a two-group, pre-test and post-test approach. Uterine involution was measured by the change in uterine fundal height, recorded daily over seven days. Participants were normal postpartum mothers attending the Pegandon and Kendal 1 Health Centers between June and August 2023. A purposive sampling technique was applied, resulting in a final sample of 30 participants divided equally into two intervention groups. The inclusion criteria consisted of mothers with normal vaginal deliveries, no spinal disorders or abnormalities, and willingness to adhere to the assigned intervention.

The first group received a structured oxytocin massage intervention. This procedure involved tactile stimulation of the lower back, specifically targeting the area of the fifth to sixth lumbar vertebrae, with the goal of triggering endogenous oxytocin release. The massage was administered by trained personnel for a duration of 2–3 minutes, once daily for seven consecutive days, starting within the first 24 hours postpartum. The second group received a nutritional intervention consisting of daily consumption of 100 grams of date fruit (*Phoenix dactylifera* L.) over the same seven-day period.

Data on uterine fundal height were collected daily by researchers using a standardized metline instrument. Data analysis was performed using an independent samples t-test in SPSS version 26.0. Ethical clearance for the study was granted by the Health Research Ethics Committee under reference number 082/09/KEPK/UBK/VII/2023, and all participants provided informed consent prior to their involvement.

RESULTS

Table 1. Characteristics of Respondents Based on Education, Parity, and Age

Characteristics	Category			
	Oxytocin Massage		Date Fruit Consumption	
	n	%	n	%
Education				
Elementary	2	12.5	4	25.0
Secondary	11	68.8	12	75.0
Higter	3	18.8	0	0
Parity				
Primipara	5	33.3	6	40.0
Multipara	10	66.7	9	60.0
Age (years)				
< 20	0	0	0	0
21-35	13	86.7	13	86.7
>35	2	13.3	2	13.3

Table 1 presents the respondents characteristics based on their educational level. The majority of mothers in the oxytocin massage group had a secondary education, comprising 11 individuals (68.8%). Similarly, in the date consumption group, the majority also had a secondary education, with 12 individuals (75.0%). In terms of parity, the majority of respondents in both groups were multiparous, with 10 individuals (66.7%) in the oxytocin massage group and 9 individuals (60.0%) in the date consumption group. Regarding age, the majority of respondents in both groups were aged 21–35 years, with 13 individuals (86.7%) in each group.

Table 2. Mean Daily Reduction in Uterine Fundal Height in the Oxytocin Massage and Date Consumption Groups

Group	Day						
	1	2	3	4	5	6	7
Oxytocin Massage (cm)	18	15.3	14.2	12.5	12.3	11.4	10.47
Date Fruit Consumption (cm)	17.2	14.8	13.2	11.6	10	8.6	6.8

The results of uterine fundal height (UFH) measurement in the oxytocin massage and date consumption groups are presented in Table 2. Within the first 24 hours postpartum (day 1), the mean UFH was 18.0 cm in the oxytocin massage group and 17.2 cm in the date consumption group. By day 7, the mean uterine fundal height was 10.47 cm in the in the oxytocin massage group and 6.8 cm in the date consumption group. The progression of the mean UFH change in both groups is visually presented in Figure 1.

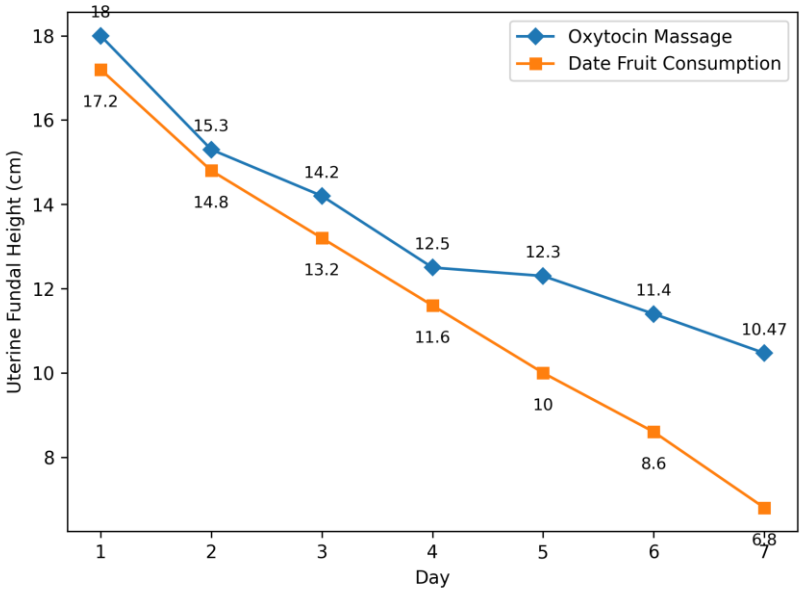

Figure 1. Graph of the mean decrease in height of the Fundus Uteri

Table 3. Normality Test Result

Group	*p value*	Description
Oxytocin Massage	0.234	Normal
Date Fruit Consumption	0.535	Normal

Table 3 presents the results of the normality test for uterine fundal height reduction data. The Kolmogorov–Smirnov test showed p-values of 0.234 for the oxytocin massage group and 0.535 for the date consumption group. Since all p-values were greater than 0.05, the data were normally distributed, allowing the use of parametric statistical analysis.

Table 4. Homogeneity Test Result

Data	Test Type	Sig.*	Interpretation
Oxytocin Massage vs. Date Fruit Consumption	Lavene test	0.277	Homogeneous

Based on Table 4, the homogeneity test yielded a p-value of 0.277, indicating that the data for both groups were homogeneous ($p > 0.05$). After confirming that the data were normally distributed and homogeneous, an independent samples t-test was conducted to compare the effectiveness of the two interventions.

Table 5. Comparison of Uterine Fundal Height Reduction Between Oxytocin Massage and Date Fruit Consumption Groups

Group	n	*Mean*	*SD*	*p*
Oxytocin Massage	15	8.07	1.87	0.01
Date Fruit Consumption	15	10.4	2.80	

Table 5 presents the mean reduction in UFH over one week. The analysis showed that the mean reduction in UFH in the date consumption group was 10.4 cm, greater than that in the oxytocin massage group (8.07 cm). The independent samples t-test yielded a p-value of 0.01. Since the p-value was less than 0.05, it can be concluded that there was a statistically significant difference in UFH reduction between the oxytocin massage and date consumption groups. These findings indicate that date consumption was more effective than oxytocin massage in accelerating uterine involution among postpartum mothers.

DISCUSSION

The Effect of Oxytocin Massage on the Reduction of Uterine Fundal Height

Uterine involution, the process by which the uterus returns to its pre-pregnancy state, is a critical physiological component of postpartum recovery. Its efficacy is largely governed by the strength and regularity of uterine contractions, which are essential for achieving hemostasis and ensuring the progressive reduction of uterine size. Inadequate contractility can disrupt this process, leading to uterine subinvolution, a condition clinically associated with persistent lochia, delayed uterine size regression, and an increased risk of secondary postpartum hemorrhage [12].

The neurohormone oxytocin, secreted by the posterior pituitary gland, is the principal regulator of postpartum uterine contractions. It exerts its effect by binding to myometrial oxytocin receptors, inducing sustained contractions that compress the uterine vasculature, thereby promoting hemostasis at the placental site and facilitating involution [13]. While exogenous oxytocin administration (e.g., intramuscular or intravenous) is the pharmacological cornerstone for postpartum hemorrhage

prevention, strategies to stimulate endogenous oxytocin release offer a complementary, non-pharmacological paradigm.

One such strategy is oxytocin massage, a targeted tactile intervention. The technique involves applying gentle, circular pressure bilaterally along the paravertebral region, specifically aligned with the thoracic vertebrae T5–T6. This stimulation is theorized to activate cutaneous sensory nerves, leading to parasympathetic nervous system engagement and subsequent hypothalamic stimulation to release endogenous oxytocin[14]. This neuroendocrine response enhances uterine tone and contractility, supporting the physiological process of involution. Oxytocin massage represents a practical application of psycho neuro endocrine principles to support postpartum uterine recovery[15].

The neurophysiological mechanism of oxytocin massage is theorized to begin with stimulation of the lower back, which transmits sensory signals via the spinal cord to the brainstem. These signals are processed in the medulla oblongata before being relayed to the hypothalamus, culminating in the secretion of oxytocin from the posterior pituitary gland [16]. The released oxytocin then binds to myometrial receptors, initiating and strengthening uterine contractions. This process is crucial for achieving hemostasis and facilitating the progressive reduction of uterine size, thereby preventing hemorrhage and subinvolution

Consistent with this mechanism, empirical studies generally support the efficacy of oxytocin massage. Research by Mintaningtyas (2022) reported that postpartum mothers receiving this intervention experienced stronger uterine contractions and a faster reduction in fundal height. [17] This aligns with findings by Jagadeeswari (2020), whose experimental study demonstrated a significantly greater improvement in uterine involution among mothers receiving oxytocin massage compared to a control group[18].

However, a critical synthesis of the literature reveals important contextual and methodological variations that must be considered when interpreting and generalizing these findings. For instance, a study by Kusumastuti et al. (2021) [19] reported a specific uterine involution time of 128.917 hours in their intervention group. While this result supports the intervention's effectiveness, direct numerical comparisons with other studies are problematic due to differences in outcome measurement (e.g., time-to-involution versus rate of fundal height decrease) and intervention protocols (e.g., massage duration, frequency, and technique). Furthermore, a comparison study by Hadianti & Sriwenda (2019) [20] concluded that oxytocin massage had a more significant effect on uterine involution than postpartum exercise, with average involution times of 6.72 and 8.68 days, respectively. This finding, while valuable, underscores the importance of the chosen comparator; the superior effect is established against one specific alternative (exercise), but its relative efficacy compared to other non-pharmacological strategies (e.g., herbal treatments or different massage techniques) or in combination with them remains less clear. The observed effect often felt by mothers as abdominal cramping is a direct clinical correlate of the oxytocin reflex, confirming the physiological activation of uterine smooth muscle [21].

In summary, while previous research robustly indicates that oxytocin massage stimulates uterine contractility and accelerates involution, the magnitude of its effect and its optimal application are likely influenced by factors such as population characteristics (e.g., parity, age), precise intervention details, and the chosen control or comparison intervention. The present study contributes to this body of evidence by providing a direct, controlled comparison between oxytocin massage and another promising non-pharmacological intervention (date fruit consumption) within a specific community health center context, thereby offering a more nuanced understanding of relative effectiveness in a defined setting.

The Effect of Date Consumption on Uterine Fundal Height Reduction

Beyond tactile stimulation, nutritional interventions offer a complementary non-pharmacological strategy to support postpartum uterine recovery. Date fruit (*Phoenix dactylifera* L.) consumption has emerged as a promising option for this purpose, with proposed mechanisms extending beyond simple caloric provision. Dates are rich in bioactive compounds, including simple sugars (fructose and glucose), fiber, and various polyphenols. Mechanistically, their high sugar content provides readily available energy for the metabolically demanding process of myometrial contraction and tissue repair post-delivery. In addition, constituents such as tannins and flavonoids have been suggested to stimulate endogenous oxytocin release or potentiate its effects on the myometrium, thereby enhancing uterine tone and contraction efficiency, which are essential for hemostasis and involution. Compounds such as serotonin, calcium, and specific fatty acids may further support myometrial function through neuromuscular modulation and prostaglandin synthesis[22,23].

Empirical evidence supports the potential role of date consumption in improving postpartum outcomes. Studies focusing on the postpartum period indicate that women who consume dates experience a more rapid reduction in uterine fundal height and a shorter duration of involution compared to control groups.[24] This effect is clinically relevant, as timely uterine involution is a key factor in preventing subinvolution and secondary postpartum hemorrhage [25]. Moreover, a substantial body of evidence from the antenatal period demonstrates that regular date intake in late pregnancy (approximately 70–80 grams daily for 2–4 weeks before delivery) is associated with favorable labor outcomes, including reduced need for induction, greater cervical dilation on admission, and shorter durations of both latent and active phases of labor[26,27]. These findings suggest that the same bioactive components that facilitate effective labor contractions may also contribute to a more efficient involution process in the postpartum period[28,29].

Despite these promising findings, several limitations of the present study must be carefully considered when interpreting the results. First, the quasi-experimental design without randomization limits the ability to establish causal relationships and increases the potential for selection bias. Second, the relatively small sample size may reduce statistical power and limit the generalizability of the findings to broader postpartum populations. Third, uterine involution was assessed solely through changes in uterine fundal height, which, although clinically practical, may not fully capture the complex physiological processes underlying uterine recovery. Additionally, potential confounding factors such

as parity, breastfeeding frequency, maternal nutritional status, and individual hormonal variability were not fully controlled.

Considering the influence of oxytocin massage and date consumption on uterine involution, the findings of this study indicate that both interventions are associated with measurable reductions in uterine fundal height among postpartum mothers. The average reduction was greater in the date consumption group (10.47 cm) compared to the oxytocin massage group (8.07 cm), with a statistically significant difference ($p = 0.01$). While these results suggest that daily consumption of 100 g of dates may be more effective than once-daily oxytocin massage in supporting uterine involution, this conclusion should be interpreted cautiously in light of the study's methodological limitations. Future research employing randomized controlled designs, larger sample sizes, and broader outcome measures is needed to confirm these findings and to better define the comparative effectiveness of non-pharmacological interventions for postpartum uterine recovery.

CONCLUSIONS AND RECOMMENDATIONS

Based on the findings of this study, the applied non-pharmacological interventions show potential in supporting postpartum recovery, specifically uterine involution, within a community-based context. However, considering the limitations of the research design and sample size, these findings must be interpreted with caution. Therefore, this approach may be considered as an educational and promotive model in community settings with similar characteristics. Further research with a more rigorous design and a larger sample is required to confirm the efficacy of these interventions before they can be recommended for broader implementation.

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