

Purple Cabbage Extract Cream: A Traditional Herbal Anti-Inflammatory for Elderly Arthritis

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Abstract: This study evaluated the effectiveness of purple cabbage extract cream as an anti-inflammatory agent to reduce swelling and enhance mobility in elderly individuals with arthritis, specifically osteoarthritis. Osteoarthritis is prevalent among the elderly, often causing joint pain, swelling, and limited mobility. Purple cabbage is rich in flavonoids and polyphenols, compounds known for their anti-inflammatory properties, and is hypothesized to aid in reducing inflammation and improving joint function. A quasi-experimental design with pre-test and post-test measurements was used on 30 elderly participants with knee swelling due to arthritis. Participants applied the cream three times daily on the affected knee, with knee circumference and the "Timed Up and Go" (TUG) test used to assess swelling and mobility, respectively. Statistical analysis revealed a significant reduction in knee circumference ($p < 0.05$) and improvement in mobility, with a shorter TUG test time after treatment. A 95% confidence interval and a p-value of 0.012 underscored the statistical significance of these results. The findings suggest that purple cabbage extract cream may be a safe, effective topical treatment for reducing swelling and enhancing mobility in elderly arthritis patients. This alternative therapy could potentially improve pain management and quality of life for elderly individuals. Further research is recommended to confirm these results and to establish optimal dosage and treatment duration.

Keywords: anti-inflammatory, arthritis, cream, elderly, osteoarthritis, purple cabbage extract

INTRODUCTION

The aging population is rapidly increasing worldwide due to rising life expectancies, bringing both demographic advantages and unique health challenges. One prevalent health issue among the elderly is arthritis, particularly osteoarthritis, which affects nearly 49.6% of adults over 65 in the United States (CDC, 2020). This condition leads to pain, swelling, and decreased mobility, significantly impacting daily activities and overall quality of life (Hunter & Bierma-Zeinstra, 2019). Conventional treatment often relies on non-steroidal anti-inflammatory drugs (NSAIDs); however, their long-term use can cause serious side effects, including gastrointestinal issues and thrombosis, which limits their suitability for elderly patients with other health conditions.

Given the demand for safer alternatives, natural anti-inflammatory remedies have gained interest. Purple cabbage (*Brassica oleracea* var. *capitata* f. *rubra*) is a promising candidate due to its rich anthocyanin content, known for potent antioxidant and anti-inflammatory effects (Zafra-Stone et al., 2007). Prior research has shown that anthocyanins from purple cabbage can reduce inflammation markers like interleukin-6 (IL-6) and tumor necrosis factor-alpha (TNF- α) (Wu et al., 2018). A topical application approach allows direct, localized treatment, minimizing systemic side effects associated with oral medications.

This study aims to advance arthritis treatment by evaluating a novel purple cabbage extract cream as a topical anti-inflammatory therapy for elderly arthritis patients. Building on findings by Deswani et al. (2021), which demonstrated anti-inflammatory effects of purple cabbage in animals, this research explores the cream's efficacy in humans through a phase 1 clinical trial. The study seeks to determine effective dosage, measure pain reduction, and improve mobility, positioning purple cabbage cream as a potentially safer, accessible alternative in geriatric arthritis care. This advancement in phytopharmaceuticals could offer elderly patients improved quality of life with minimal side effects, addressing a significant gap in arthritis management for this population.

MATERIALS AND METHODS

Study Design and Objectives

This clinical study is a Phase II, single-arm observational clinical trial aimed at evaluating the safety, tolerability, and effectiveness of a purple cabbage cream for treating arthritis symptoms in elderly participants. The open-label study design means all participants will receive the same treatment without a control group, which helps us assess the cream's therapeutic impact directly. Specifically, the trial seeks to examine reductions in pain and inflammation, improvements in joint mobility, and the onset and duration of the cream's effects.

Phase I Objectives include measuring pain reduction, assessing inflammatory changes, and evaluating improved joint mobility and onset duration. Additionally, the study aims to compare the cream's effectiveness with standard treatments.

Sampling Method

The study uses a consecutive sampling technique, selecting participants who meet all inclusion criteria within a one-month window to ensure sample size requirements are met. Consecutive sampling, while a non-probability method, is suitable here as it simplifies recruiting participants who are representative of the target population.

The sample size formula for hypothesis testing in a two-proportion independent sample was applied. To calculate, data on the standard effect proportion (P1) was gathered from literature, while the test effect (P2) was based on clinical judgment to ensure meaningful results without underestimating the sample needed.

Participant Selection and Criteria

Participants, elderly individuals aged 60 and above with an arthritis diagnosis, will be selected based on specific inclusion criteria, including the presence of joint pain, swelling, and stiffness verified by a physician, and an absence of metabolic or immune disorders. Those with a history of allergies to topical treatments will undergo a patch test with the purple cabbage cream to confirm tolerance.

Preparation and Formulation of the Test Cream

The purple cabbage cream will be prepared in the Poltekkes Kemenkes Jakarta II laboratory, following a standard formulation designed to maximize efficacy and safety. The cream contains water extract fractions of purple cabbage (0.3-10%), Cera alba (beeswax), Span 80, liquid paraffin, glycerin, purified water, and other stabilizers and preservatives. Following formulation, each batch will be evaluated for homogeneity, pH, viscosity, spreadability, and stability.

Data Collection and Intervention Procedures

Thirty elderly participants will be recruited and trained in applying the purple cabbage cream three times daily—morning, afternoon, and evening—over four days. Each of the ten study enumerators will be assigned five participants to ensure adherence to protocol and accurate data collection.

Before beginning the study, enumerators will conduct the following pre-test assessments:

1. Measure vital signs (blood pressure, pulse, respiration, temperature).
2. Conduct a timed-up-and-go test to assess mobility.
3. Evaluate knee conditions using a standardized pain scale (McGill Pain Questionnaire, VAS, and NRS).
4. Photograph participants' knees for visual records.

The first application of the cream will be supervised, demonstrating the proper method and ensuring all participants understand the schedule. Data from the initial assessments and each follow-up will be recorded on a secure G-Form platform.

Follow-Up and Data Collection: On days two and three, enumerators will visit participants' homes to record pain scale scores and knee measurements. A final in-person evaluation will be conducted on day five, including all assessments initially conducted on day one. Throughout the study, enumerators will check in daily with participants via WhatsApp, and participants can contact the research team in case of any adverse effects or concerns.

Adverse Event Management

Participants will be monitored closely for adverse effects, including any signs of skin irritation such as redness, swelling, or itchiness. Should any adverse events occur, enumerators will stop the treatment and promptly consult with the medical team at Munjul Health Center. Any participants experiencing adverse reactions will have their treatment discontinued, and data regarding the reaction will be documented.

Compensation and Ethical Considerations

Participants will receive a small daily transportation stipend, and an additional token of appreciation will be provided upon study completion. Should a participant withdraw, any data collected to that point will be returned, and their remaining treatment will be collected. New participants meeting inclusion criteria will replace those who withdraw.

The study has been approved by the MKPEK ethics board at Poltekkes Jakarta III and the Health Department. Consent forms will detail participants' rights and study expectations, including the right to withdraw at any time without penalty.

Clinical Testing and Final Assessment

The primary outcomes include changes in pain severity, inflammation reduction, and mobility improvements measured through standardized clinical scales and mobility tests. Participants' responses will be documented using pain scales, clinical joint assessments, and knee measurements. These final assessments will help to establish the efficacy and safety profile of the purple cabbage cream as a topical therapy for elderly individuals with arthritis.

RESULTS AND DISCUSSION

Respondent Characteristics

A total of 30 respondents, all aged over 60 and diagnosed with arthritis, participated in this study. The average age was 70.76 years, with a gender distribution of 5 men and 25 women, reflecting the higher prevalence of arthritis among elderly women due to factors such as hormonal influences.

Normality Testing

The Shapiro-Wilk test was used to assess data normality, showing that:

- **Timed Up and Go (TUG) Test:** Data after intervention did not follow a normal distribution, while data before intervention did.
- **Knee Circumference Measurements:** Data for both right and left knees followed a normal distribution on both measurement dates (October 7th and 11th).

Since the TUG data did not meet the normality assumption, the Wilcoxon test was applied, while the t-test was used for knee circumference due to normal data distribution.

Wilcoxon Test Results

Table I presents the Wilcoxon test findings for TUG and pain scales before and after treatment. The results show:

- **Timed Up and Go (TUG):** 23 respondents showed an improvement (lower TUG time after treatment), with an average rank of 15.76, while 7 showed a decline.
- **Pain Scale:** 27 respondents reported decreased pain, while only 1 showed an increase.

The significant p-values ($p < 0.05$) indicate that the intervention had a positive effect on both walking ability and pain reduction.

Paired T-Test Results

As shown in Table II, the paired t-test results for knee circumference measurements indicate:

- **Right Knee Circumference:** A statistically significant reduction (mean difference of 0.87, $p = 0.012$) in circumference after treatment.
- **Left Knee Circumference:** No significant change was observed ($p > 0.05$).

These findings demonstrate the cream's impact on reducing right knee swelling but not significantly affecting the left knee circumference.

Discussion

Effect on Mobility

The application of purple cabbage extract cream significantly improved mobility, as indicated by the TUG test results ($p = 0.007$). This improvement could be associated with decreased pain and joint stiffness, enabling freer movement. Research by Åhlund et al. (2018) suggests that a reduction in TUG test time can notably lower the risk of falls, an essential benefit for elderly individuals.

Pain Reduction

The significant decrease in pain levels ($p < 0.01$) reflects the analgesic potential of purple cabbage extract cream. Compounds like flavonoids and polyphenols present in purple cabbage are known to inhibit inflammatory pathways, potentially reducing pain through the suppression of prostaglandin production (Dragos et al., 2017; Hunter et al., 2019). This finding suggests that purple cabbage extract cream could be a valuable alternative to NSAIDs, especially for elderly patients seeking pain relief without systemic side effects.

Knee Circumference and Swelling

The right knee circumference showed a statistically significant decrease post-intervention ($p = 0.012$), suggesting that the cream effectively reduced inflammation in that area. However, the lack of a similar reduction in the left knee may indicate variability in how inflammation is distributed or how each knee responded to treatment. Brophy et al. (2022) observed that knee circumference is closely linked to arthritis severity; thus, the decrease noted in the right knee circumference highlights the cream's potential to alleviate arthritis-related swelling.

Implications for Arthritis Management

These findings suggest that purple cabbage extract cream may be a safe and effective option for managing arthritis symptoms in elderly patients. This aligns with other studies that support the use of topical herbal treatments for pain and inflammation management (Sinatti et al., 2022; Araya et al., 2020). Purple cabbage's natural compounds offer multiple mechanisms for reducing inflammation and could be explored further in non-topical forms.

Table I: Wilcoxon Test Results for Timed Up and Go (TUG) and Pain Scale

Measure	N	Mean Rank	Sum of Ranks	Z	p-value
TUG	23	15.76	362.50	-2.678	0.007
Pain Scale	27	14.96	404.00	-4.587	<0.001

Table II: Paired T-Test Results for Knee Circumference

Pair	Mean Difference	Std. Deviation	Std. Error Mean	95% CI (Lower, Upper)	t	df	P-value
Right Knee (Before-After)	0.87	1.76	0.32	(0.21, 1.52)	2.693	29	0.012
Left Knee (Before-After)	0.25	2.62	0.48	(-0.73, 1.23)	0.523	29	0.605

Conclusion

Purple cabbage extract cream demonstrated significant effects in reducing pain and right knee swelling, alongside improving mobility among elderly patients with arthritis. These results support its potential as a natural alternative for managing arthritis symptoms, meriting further research into its mechanisms and applications in broader arthritis management approaches.

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