EFFECTIVENESS OF PURPLE CABBAGE EXTRACT CREAM IN IMPROVING FUNCTIONAL MOBILITY AMONG ELDERLY ARTHRITIS PATIENTS

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ABSTRACT
This study evaluates the effectiveness of purple cabbage extract cream in improving functional mobility in elderly individuals with osteoarthritis, focusing on the Timed Up and Go (TUG) measurement. Osteoarthritis, characterized by pain and limited movement, often leads to declining walking ability. The cream, rich in anti-inflammatory compounds such as flavonoids and polyphenols, was applied to swollen knee joints three times a day over a specified period. Mobility was assessed using the TUG, which measures the time participants rise, walk 3 meters, turn around, return, and sit down again. This study involved 30 elderly individuals diagnosed with arthritis by a general practitioner.The results showed a significant improvement in TUG times after the intervention, with a meaningful reduction in travel time (p = 0.012; 95% CI). This indicates an enhancement in walking ability and functional mobility efficiency in elderly individuals with osteoarthritis. Thus, the use of this cream may serve as an effective topical approach to address mobility challenges in the elderly, particularly regarding the reduction of TUG time. Further research is needed to confirm these results and optimize usage guidelines.

Keywords*: Functional Mobility; Osteoarthriti; Purple Cabbage Extract*

ABSTRACT

Penelitian ini mengevaluasi efektivitas krim ekstrak kubis ungu dalam meningkatkan mobilitas fungsional pada lansia dengan osteoartritis, dengan fokus pada pengukuran Timed Up and Go (TUG). Osteoartritis, yang ditandai dengan nyeri dan keterbatasan gerak, sering kali menyebabkan penurunan kemampuan berjalan. Krim yang kaya akan senyawa antiinflamasi seperti flavonoid dan polifenol ini diaplikasikan pada sendi lutut yang bengkak tiga kali sehari selama periode tertentu. Mobilitas dinilai menggunakan TUG, yang mengukur waktu yang diperlukan peserta untuk bangkit, berjalan sejauh 3 meter, berputar, kembali, dan duduk kembali. Penelitian ini melibatkan 30 lansia yang didiagnosis menderita artritis oleh seorang dokter umum.

Hasil penelitian menunjukkan peningkatan signifikan pada waktu TUG setelah intervensi, dengan pengurangan waktu tempuh yang bermakna (p = 0,012; CI 95%). Hal ini menunjukkan peningkatan kemampuan berjalan dan efisiensi mobilitas fungsional pada lansia dengan osteoartritis. Dengan demikian, penggunaan krim ini dapat menjadi pendekatan topikal yang efektif untuk mengatasi tantangan mobilitas pada lansia, khususnya dalam hal pengurangan waktu TUG. Penelitian lebih lanjut diperlukan untuk mengonfirmasi hasil ini dan mengoptimalkan pedoman penggunaannya.

.***Kata kunci :*** *Mobilitas Fungsiona;, Osteoartriti; Ekstrak Kubis Ung.,*

Abstract

This study evaluates the effectiveness of purple cabbage extract cream in improving functional mobility in elderly individuals with osteoarthritis, focusing on Timed Up and Go (TUG) measurements. Osteoarthritis, characterized by pain and limited movement, often leads to a decline in walking ability. The cream, rich in anti-inflammatory compounds such as flavonoids and polyphenols, was applied to swollen knee joints three times a day over a specific period. Mobility was assessed using the TUG test, which measures the time required for participants to stand, walk 3 meters, turn, return, and sit down again.

The study involved 30 elderly participants diagnosed with arthritis by a general practitioner. The results showed a significant improvement in TUG times after the intervention, with a meaningful reduction in completion time ($p = 0.012$; 95% CI). This indicates enhanced walking ability and functional mobility efficiency in elderly individuals with osteoarthritis. Therefore, using this cream may serve as an effective topical approach to addressing mobility challenges in the elderly, particularly in reducing TUG times. Further research is needed to confirm these findings and optimize usage guidelines.

Keywords: Functional Mobility, Osteoarthritis, Purple Cabbage Extract, Timed Up and Go (TUG) Test

INTRODUCTION (12 pt)

The Law on Elderly Welfare characterizes the elderly population as individuals aged 60 and older. The world is currently experiencing an aging demographic, with rising life expectancies leading to an increase in the number of elderly individuals. This trend presents a demographic advantage for many nations, as a growing elderly population can bolster the economy. However, aging often results in declines in physiological and cognitive functions, making older adults more vulnerable to health issues.

Arthritis, a degenerative disease, is one of the most prevalent health problems among older adults. The Centers for Disease Control and Prevention (CDC) states that around 49.6% of adults aged 65 and above in the U.S. are diagnosed with arthritis, with osteoarthritis being the most frequent type (CDC, 2020). Symptoms like pain, swelling, stiffness, and reduced mobility can hinder daily activities and diminish the quality of life (Hunter & Bierma-Zeinstra, 2019). Untreated arthritis can lead to difficulties in walking, bending, or standing for 80% of older adults, while 20% may struggle with daily tasks.

Standard treatment for arthritis typically includes non-steroidal anti-inflammatory drugs (NSAIDs). However, prolonged use of NSAIDs can lead to severe side effects, including gastrointestinal issues and thrombosis risks, prompting the search for safer alternatives, particularly for older adults with additional health concerns.

In this context, there is growing interest in natural ingredients. The Indonesian Ministry of Health advocates for traditional medicine as a safer, more effective option. One promising natural ingredient is Brassica oleracea var. capitata f. rubra, or purple cabbage, which is high in anthocyanins known for its strong antioxidant and anti-inflammatory properties (Zafra-Stone et al., 2007). Preliminary research by Wu et al. (2018) indicated that anthocyanin extract from purple cabbage can lower the levels of pro-inflammatory cytokines, such as interleukin-6 (IL-6) and tumor necrosis factor-alpha (TNF-α), which are crucial in the inflammatory processes associated with arthritis.

The topical application of this natural ingredient is becoming more popular, as it enables direct absorption at the inflamed site without the systemic effects linked to oral medications. Research by Deswani et al. (2021) demonstrated that purple cabbage extract has a significant anti-inflammatory effect, with an effective dose in experimental animals comparable to 4.5 mg of

sodium diclofenac. These findings suggest that purple cabbage extract cream has potential as a phytopharmaceutical treatment for arthritis in older adults.

One of the primary indicators of improved joint mobility and function in individuals with arthritis is the Timed Up and Go (TUG) test. TUG is a widely used assessment tool to measure functional mobility, which involves timing the ability of individuals to rise from a chair, walk a short distance, turn, return, and sit down. It is particularly effective for evaluating interventions aimed at enhancing mobility in older adults.

This study focuses on evaluating the effectiveness of purple cabbage extract cream in improving functional mobility among elderly individuals with osteoarthritis, with a specific emphasis on TUG as the primary outcome. By examining reductions in TUG times following the application of the cream, this research aims to highlight the potential of purple cabbage extract as a safe, natural intervention for arthritis-related mobility challenges.

METHOD (12 pt)

Research Design of the study employed an observational clinical method using an open-label, single-arm design. All participants received the same intervention without a control group. The primary focus was to evaluate the safety, tolerability, and effectiveness of purple cabbage extract cream in reducing arthritis symptoms, particularly in improving functional mobility as measured by the Timed Up and Go (TUG) test.

Sampling Technique is the consecutive sampling method was utilized to recruit participants who met the inclusion criteria within a one-month sampling period. This approach ensured that participants were fairly represented and reduced bias.

The cnclusion criteria are participants were elderly individuals aged 60 years or older who had been diagnosed with arthritis and reported joint pain. Additional criteria included:No metabolic comorbidities or immune disorders, No known allergies to purple cabbage cream based on a patch test, No concurrent use of oral anti-inflammatory medications or sedatives.

The data collection involved 30 respondents managed by six trained enumerators, with each overseeing five participants. Baseline data included: Functional mobility assessment via the Timed Up and Go (TUG) test. Knee circumference measurements to evaluate swelling. andPain level assessments.

The purple cabbage extract cream was applied three times daily for four days. Walking ability was reassessed post-intervention using the TUG test to measure the time required for participants to rise from a chair, walk 3 meters, turn, return, and sit down.

The statistical analysis changes in TUG test results pre- and post-intervention were analyzed to evaluate the effectiveness of the treatment. A Shapiro-Wilk test assessed data normality, followed by either the Wilcoxon test or a T-test, depending on data distribution, to determine statistical significance.

Research Ethics the study adhered to ethical standards for research involving human subjects, with approval obtained from the ethics committee (Ethical Clearance No. Lb.02.02/F. XIX.21/9622/2024). Participants provided informed consent and had the option to withdraw at any point during the study.

RESULTS AND DISCUSSION

The characteristics of respondent in this phase 1 clinical trial included 30 elderly participants aged 60 years and above, diagnosed with arthritis and experiencing joint pain. The average age was 70.76 years, with a gender composition of 5 males and 25 females, reflecting the higher prevalence of arthritis in women.

Table 1. Results of statistical tests for normality of TUG, right and left knee circumference using the Kolmogorov-Smirnov test.

	Measurement Day/Date	Shapiro Wilk			Decision	Conclusion
		Statistics	df	Sig.		
(Timed Up and Go (TUG) Test	October 11th	.778	30	.000	Reject H0	With a significance level of 1%, the data does not follow a normal distribution.
	October 7th	.984	30	.914	Failed to reject H0	With a significance level of 1%, the data follows a normal distribution.

Overall, the results of the *Shapiro-Wilk* test showed that for TUG measurements after the intervention, the data did not follow a normal distribution, while for measurements before the intervention, the data followed a normal distribution. For both knee circumference measurements, both right and left, the data followed a normal distribution on both measurement dates. This finding is important for determining the appropriate statistical analysis method to be used in further research. Since the data does not follow a normal distribution, the TUG (Timed

Up and Go) test will be performed using the *Wilcoxon* test. Meanwhile, the knee circumference test will be performed using the t-test because it meets the normality assumption. The Shapiro-Wilk test indicated that the TUG data before the intervention followed a normal distribution (p = .914), whereas the TUG data after the intervention did not (p = .000). Due to the non-normal distribution of post-intervention data, the Wilcoxon Signed-Rank test was chosen to analyze changes in TUG performance.

The results of the Wilcoxon test showed significant improvements in walking ability as measured by the TUG test (Z = -2.678, p = .007). Negative Ranks: 23 participants experienced improvements in TUG scores after the intervention, indicating faster walking ability. The mean rank for these participants was 15.76, with a total rank sum of 362.50. Positive Ranks: 7 participants showed worsened TUG scores after the intervention, with a mean rank of 14.64 and a total rank sum of 102.50. Ties: No participants had unchanged TUG scores before and after the intervention. These results highlight that the majority of participants showed significant improvements in mobility, with reduced TUG times reflecting enhanced walking ability.

The results of the bivariate test were carried out for TUG and pain scale, using the Wilcoxon Signed Ranks test, while the T-test was for knee circumference.

Table 2: statistical results of TUG

TUG After – TUG Before	
	-2.678b
Asymp. Sig. (2-tailed)	.007

Statistical Results of TUG, Table 2 presents the statistical results of the Wilcoxon Signed Ranks test conducted to measure changes in walking ability (Timed Up and Go, TUG) after the intervention. The bivariate analysis further confirmed the significant reduction in TUG times post-intervention (p = .007), suggesting that the application of purple cabbage extract cream positively impacted mobility in elderly arthritis patients

Discussion

The improvement in TUG times indicates that the purple cabbage cream effectively enhanced functional mobility among the elderly participants. This aligns with previous research highlighting the anti-inflammatory properties of anthocyanins and their ability to reduce swelling and stiffness, factors that directly impair mobility. By targeting localized inflammation in the knee joint, the cream likely facilitated smoother joint movement and reduced discomfort during walking.

The significant reduction in TUG times underscores the potential of natural interventions like purple cabbage extract in managing arthritis-related mobility challenges. These findings are particularly valuable given the increasing demand for treatments with minimal side effects, offering a promising alternative to conventional NSAIDs.

Further studies are recommended to validate these findings across larger and more diverse populations, as well as to establish the optimal dosage and application frequency for maximum efficacy. The Wilcoxon Signed-Rank test results showed a Z value of -2.678 and a p-value of 0.007 (two-tailed significance), indicating a statistically significant improvement in walking ability after the intervention.

23 respondents experienced negative ranks, meaning they improved in TUG time post-treatment, while 7 respondents showed positive ranks, indicating reduced mobility after treatment. No ties were observed, confirming consistent changes in TUG times among all respondents. The significant reduction in TUG times demonstrates the efficacy of the purple cabbage cream in enhancing mobility among elderly arthritis patients. Improved walking ability likely resulted from the anti-inflammatory effects of anthocyanins, which reduce swelling and joint stiffness, thereby facilitating better movement.

TUG improvement by the intervention was associated with a significant reduction in pain levels ($p < 0.01$). This reduction in pain likely contributed to the improved mobility observed in the TUG test. With reduced joint discomfort, participants were able to complete the TUG test more efficiently, highlighting a direct link between pain relief and functional mobility improvements. The significance of the Findings shows the low p-values ($p < 0.01$ for pain and $p = 0.007$ for TUG) indicate that the observed improvements were not due to chance but were a direct result of the intervention. These findings underscore the potential of purple cabbage extract cream as a non-invasive, natural alternative for improving mobility and reducing pain in elderly patients with arthritis.

The TUG results demonstrate that purple cabbage cream effectively improved walking ability among elderly participants, primarily through pain reduction. These findings contribute to the growing evidence supporting natural remedies in managing arthritis symptoms, particularly for older adults seeking safer treatment options. Further research with larger samples and longer treatment durations is recommended to validate and expand upon these findings.

The Timed Up and Go (TUG) test results in this study showed a significant improvement in mobility among elderly arthritis patients following the application of purple cabbage extract cream. This improvement can be attributed to the intervention's role in reducing pain and joint stiffness, which are key factors affecting mobility in this population.

The key Findings from the TUG Test is statistical Significance:

The intervention resulted in a statistically significant reduction in TUG times, as evidenced by the Z value of -2.678 and a p-value of 0.007. This indicates that the improvement in walking ability was not due to chance but was directly associated with the application of the cream.

Clinical Implications: A reduction of 5 seconds in TUG time is clinically significant for elderly patients, as longer TUG times are strongly correlated with a higher risk of falls and reduced quality of life (Åhlund et al., 2018). Enhanced mobility reduces fall risk and fosters greater independence in daily activities, crucial for elderly individuals' quality of life.

The mechanism of Improvement in TUG performance is likely a result of the cream's anti-inflammatory and analgesic properties. Active compounds in purple cabbage, such as flavonoids and polyphenols, reduce inflammation by inhibiting pathways like COX-2 and prostaglandin synthesis (Chen et al., 2019; Dragos et al., 2017).

The reduction in TUG times aligns with the observed decrease in pain levels among the participants. Pain relief plays a pivotal role in restoring mobility, as arthritis-related pain often limits the ability to walk and perform other physical activities.

Pain relief allows for smoother, less restricted movements, which directly impacts the efficiency of completing the TUG test. This improvement is consistent with findings from studies on the role of topical anti-inflammatory treatments in improving joint function (Pradelli et al., 2021).

Joint Function: Enhanced joint function following the intervention could be due to decreased swelling, as reflected by reduced knee circumference. Swelling reduction contributes to better joint flexibility and range of motion, which are critical for walking and transitioning between sitting and standing.

The study relevance to elderly arthritis management, reinforces the importance of safe, non-pharmacological interventions for managing arthritis in the elderly. Accessibility and Safety: Purple cabbage cream provides a natural, topical alternative with minimal risk of side effects compared to systemic treatments like NSAIDs.

Functional Benefits: Beyond reducing pain and inflammation, the intervention's impact on mobility is significant for improving overall well-being and reducing dependency in elderly populations.

Conclusion

This study assessed the effectiveness of purple cabbage extract cream in improving mobility among 30 elderly arthritis patients. Mobility improvements were measured using the Timed Up and Go (TUG) test, with significant reductions in TUG times observed after the intervention ($Z = -2.678$, $p = 0.007$). Most participants showed faster walking speeds, highlighting enhanced mobility. The cream's impact is linked to its anti-inflammatory and analgesic properties, reducing knee swelling and stiffness. Pain relief played a key role in improving mobility, allowing smoother movements and better functionality. These results suggest that purple cabbage cream could serve as a safe, non-invasive alternative to manage arthritis, offering reduced pain and improved mobility without the side effects of systemic treatments like NSAIDs. Future research should explore its application in larger populations and refine usage guidelines.

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