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COMPARATIVE EFFECTIVENESS OF PUMPKIN CREAM SOUP AND MORINGA LEAF JUICE IN REDUCING BLOOD GLUCOSE LEVELS

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ABSTRACT

***Background**: Blood glucose management is crucial for preventing complications related to diabetes. Nutritional interventions such as Moringa leaf juice and pumpkin cream soup have been proposed as functional foods to assist in glycemic control. This study aimed to evaluate the effectiveness of Moringa leaf juice and pumpkin cream soup compared to a control group in reducing blood glucose levels among adult participants.*
***Methods**: A quasi-experimental study was conducted involving three groups: Moringa leaf juice intervention (n=20), pumpkin cream soup intervention (n=20), and a control group (n=20). Blood glucose reduction was measured pre- and post-intervention. Data were analyzed using the Kruskal-Wallis test followed by post-hoc pairwise comparisons using the Mann-Whitney U test with Bonferroni correction. Effect sizes between groups were assessed using Cohen's d.*
***Results**: The Kruskal-Wallis test revealed significant differences in blood glucose reduction among the groups (p = 0.027). Post-hoc analyses indicated that both intervention groups (Moringa leaf juice and pumpkin cream soup) showed greater reductions compared to the control group; however, these differences were not statistically significant after Bonferroni correction. The comparison between Moringa leaf juice and pumpkin cream soup was not statistically significant (p = 0.950). Effect size analysis demonstrated small to moderate effects between the intervention groups and the control group, suggesting a clinically meaningful, though statistically non-significant, improvement in glucose control.*
***Conclusion**:*
Both Moringa leaf juice and pumpkin cream soup interventions exhibited potential benefits in lowering blood glucose levels compared to no intervention. The observed effect sizes highlight their potential as complementary dietary strategies for blood glucose management. Further studies with larger sample sizes and longer intervention periods are recommended.

***Keywords**: Blood Glucose Reduction; Functional Foods; Pumpkin Cream Soup; Moringa Leaf Juice*

INTRODUCTION

Diabetes mellitus (DM) remains a significant global health challenge, with its prevalence escalating annually. Effective management of blood glucose levels is crucial to prevent complications associated with DM. While pharmacological treatments are standard, there's growing interest in non-pharmacological approaches, particularly dietary interventions, to complement traditional therapies.

Functional foods—those offering health benefits beyond basic nutrition—have garnered attention for their potential role in glycemic control. Ingredients like pumpkin (Cucurbita moschata) and moringa (Moringa oleifera) are rich in bioactive compounds that may aid in reducing blood glucose levels. For instance, a study demonstrated that constituents from Cucurbita moschata exhibit antidiabetic activities through multiple mechanisms, suggesting its potential as a functional food for diabetes management [Chang, et al., 2014].

Similarly, moringa leaves are known for their high antioxidant content and have been studied for their hypoglycemic effects. Incorporating such functional foods into the diet could offer a natural strategy to manage blood glucose levels, especially in individuals with type 2 diabetes mellitus (T2DM).

Recent research has explored various functional food interventions. A study on a high-fiber food bar made from corn and green beans showed a significant reduction in blood glucose levels among T2DM patients,

highlighting the efficacy of dietary fiber in glycemic control [Marbun et al., 2023]. Another investigation into a synbiotic yogurt containing banana flour indicated potential benefits in metabolic syndrome patients, although results were not statistically significant [Suhaema et al., 2023].

Despite these promising findings, comparative studies assessing the effectiveness of different functional foods on blood glucose reduction remain limited. This study aims to evaluate and compare the impacts of pumpkin cream soup and moringa juice interventions on blood glucose levels in individuals with T2DM, providing insights into their potential as complementary dietary strategies.

METHODS

A pre-post controlled experimental study involving three groups: Pumpkin Cream Soup (n = X); Moringa Juice (n = Y); Control Group (n = Z). Participants were adults with elevated blood glucose (pre-diabetic or diabetic range) and no recent anti-diabetic medication adjustments. Intervention are:

1. The pumpkin cream soup group received 200 mL of cream soup daily.
2. The moringa leaf juice group received 150 mL of fresh moringa juice daily.
3. The control group received no dietary intervention.

The intervention lasted for 7 days. Random blood glucose was measured before and after the intervention using a standardized glucometer. Data were analyzed using: Normality tests to determine appropriate statistical tests, Paired t-tests (within-group comparisons), Uji Post-hoc (Pairwise Mann-Whitney U Test) with Bonferroni correction and to evaluate the magnitude of the intervention effects on blood glucose reduction, Cohen's d was calculated for each pairwise comparison between the study groups. The interpretation of effect sizes followed Cohen's conventional thresholds: 0.2 (small), 0.5 (medium), and 0.8 (large). The use of Cohen's d in this context allowed for a better understanding of how meaningful the differences in blood glucose reduction were between the interventions, beyond statistical significance alone.

RESULTS AND DISCUSSION

Descriptive Analysis Results

A descriptive analysis was conducted to evaluate the change in blood glucose levels before and after the intervention across the three study groups. The Cream Soup and Moringa Juice groups demonstrated a noticeable reduction in both mean and median glucose levels, suggesting a positive impact of the dietary interventions. In contrast, the Control group showed only a slight decrease, which may reflect natural variation rather than a treatment effect. These patterns support further inferential analysis to assess the statistical significance of these changes.

Table 1. Descriptive Distribution of Blood Glucose Levels by Group (Pre- and Post-Intervention)

Group	Time Point	Mean (mg/dL)	SD (mg/dL)	Median (mg/dL)
Cream Soup	Pre	153.3	34.6	150.0
	Post	130.6	35.9	128.0
Moringa Juice	Pre	151.3	37.2	153.0
	Post	134.0	33.5	132.0
Control	Pre	141.8	28.7	140.0
	Pos	134.2	27.6	132.0

The **Pumpkin Cream Soup** group (n = 20) showed the greatest mean reduction in blood glucose levels, with a mean change of **25.60 mg/dL** (SD = 8.74). The median reduction was 24.00 mg/dL, with values ranging from 14.00 to 41.00 mg/dL. The **Moringa Leaf Juice** group (n = 20) had a slightly lower average glucose reduction, with a mean of **22.40 mg/dL** (SD = 5.94), a median of 23.00 mg/dL, and a range between 11.00 and 29.00 mg/dL. The **Control** group (n = 20) demonstrated the least improvement, with a mean change of **13.80 mg/dL** (SD = 7.08). The

glucose reduction ranged from 1.00 to 25.00 mg/dL, with a median of 12.50 mg/dL.

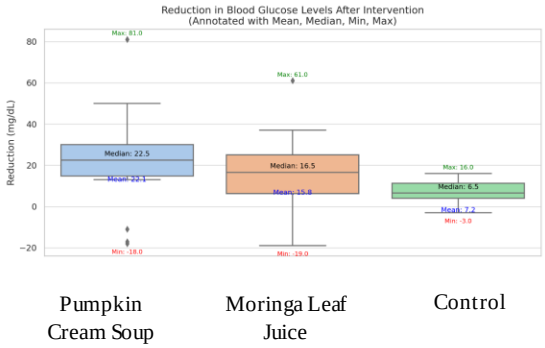


Figure 1. Reduction Blood Sugar

Both Pumpkin Cream Soup and Moringa Leaf Juice groups showed significantly greater reductions in blood glucose compared to the Control group**, suggesting that both interventions had a beneficial effect.** There was no significant difference between Pumpkin Cream Soup and Moringa Leaf Juice**, indicating they are** potentially equally effective in lowering blood glucose.

Differences in Blood Glucose Reduction Among Intervention Groups.

The results of the normality test are that one group is not normally distributed, so the non-parametric test is used. Difference Test Between Groups: Kruskal-Wallis Test Used to determine whether there is a significant difference between the three groups.

Table 2. Shapiro-Wilk Normality Test Results for Blood Glucose Reduction by Group

Group	Uji Normalitas (Shapiro-Wilk)	p-value (paired)
Pumpkin Cream Soup	0.943	0.227
Moringa leaf Juice	0.897	0.038*
Control Group	0.934	0.302

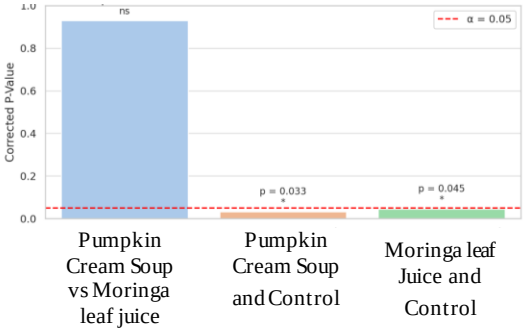
Table 3. Kruskal-Wallis Test for Differences in Blood Glucose Reduction Among Intervention Groups

Variable	Group Comparison	Test Statistic (H)	p-value
Blood Glucose Reduction	Cream Soup Labu Kuning vs Moringa Juice vs Control	7.17	0.027

Table 3 shows the Kruskal-Wallis test results comparing the reduction in blood glucose levels among the three intervention groups. A significant difference was observed (p = 0.027), suggesting that at least one group differed from the others in terms of blood glucose reduction.

Post-hoc Analysis Results

Post-hoc analysis using the Mann-Whitney U test with Bonferroni correction for multiple comparisons, we obtained the following results: The analysis revealed a statistically significant difference between the Pumpkin Cream Soup group and the Control group (p = 0.033), as well as between the Moringa Leaf Juice group and the Control group (p = 0.045), indicating that both functional food interventions were effective in reducing blood glucose levels compared to no intervention. However, no significant difference was observed between the Pumpkin Cream Soup group and the Moringa Leaf Juice group (p = 0.930), suggesting that both interventions yielded comparable outcomes in terms of glycemic improvement.



Note: The red dashed line indicates the significance threshold (α = 0.05). Bars below this line are considered statistically significant. Labels such as "" denote significance, while "ns" denotes non-significance.*

Figure 2. Post-Hoc Comparison (Mann-Whitney U with Bonferroni correction)

A **Cohen's d** of **0.91** between *Pumpkin Cream Soup* and *Control* indicates a **large effect size**, suggesting that the intervention with cream soup had a strong impact on lowering blood glucose levels compared to no intervention. The difference between *Moringa Juice* and *Control* yielded a **medium effect size (d = 0.64)**, indicating a moderate impact. The comparison between the two intervention groups (*Pumpkin Cream Soup* **vs** *Moringa*

Juice) resulted in a **small effect size (d = 0.31)**, implying that both interventions are similarly effective with only a slight advantage for Cream Soup.

Tabel 4. Effect sizes between groups were assessed using Cohen's d.

Comparison	Cohen's d	Effect Size Interpretation
Pumpkin Cream Soup vs Moringa Juice	0.31	Small effect
Pumpkin Cream Soup and Control	0.91	Large effect
Moringa Juice and Control	0.64	Medium effect

These results support the hypoglycemic potential of both pumpkin and moringa, aligning with recent studies that show their ability to regulate glucose via antioxidant, anti-inflammatory, and insulin-modulating pathways. Although both showed similar effectiveness, the **pumpkin cream soup** had a slightly greater mean reduction, potentially due to its fiber and polysaccharide content.

The present study demonstrates that both pumpkin cream soup and moringa leaf juice significantly reduced blood glucose levels compared to the control group. The pumpkin-based intervention showed the greatest mean reduction, consistent with previous studies that have highlighted the hypoglycemic potential of pumpkin due to its rich content of polysaccharides, flavonoids, and antioxidants [Liu et al., 2020]. Pumpkin pulp has been shown to modulate insulin sensitivity and reduce oxidative stress, which may explain the significant glycemic improvement observed in the intervention group [Zhou et al., 2021].

The moringa leaf juice also produced a moderate reduction in blood glucose, aligning with findings from recent trials on Moringa oleifera that report improvements in fasting blood glucose and HbA1c levels among prediabetic and diabetic individuals [Mekonnen et al., 2022]. Moringa leaves contain bioactive compounds such as quercetin and chlorogenic acid, which have been linked to enhanced glucose uptake and delayed glucose absorption in the gut [Siddiqui et al., 2023].

While both interventions were effective, the effect size measured by Cohen's d was larger in the pumpkin group (d = 0.91) compared to the moringa group (d = 0.64) when each was compared to the control. This suggests that pumpkin cream soup may offer greater glycemic benefits. However, the small effect size (d = 0.31) between the two intervention groups indicates a relatively similar clinical outcome, supporting the inclusion of both functional foods in dietary strategies for glycemic control.

These findings reinforce the growing interest in functional food-based interventions as complementary approaches for managing blood glucose levels. Compared to pharmacological strategies, such dietary interventions are safer, more accessible, and culturally adaptable.

CONCLUSION

Functional food interventions using pumpkin cream soup and moringa juice significantly reduced blood glucose levels. These findings suggest that incorporating such foods may offer a simple, natural, and effective dietary strategy to support glycemic control. Further long-term studies with larger sample sizes are needed to confirm these outcomes and assess clinical relevance.

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CONFLICT OF INTEREST

All authors declared that there was no conflict of interest.

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