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EFFECTIVENESS OF GALO-GALO HONEY SUPPLEMENTATION COMBINED WITH IRON TABLETS ON HEMOGLOBIN LEVELS AMONG FEMALE MIDWIFERY STUDENTS

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Abstract
Background: Anemia remains an important nutritional problem among adolescent girls and young women. Female university students are vulnerable to iron deficiency because of menstrual blood loss, inadequate dietary iron intake, and irregular eating patterns. This study evaluated the effectiveness of Galo-Galo honey supplementation combined with iron tablets in increasing hemoglobin levels among female midwifery students. Methods: A quantitative pre-experimental study with two pretest-posttest groups was conducted among 38 female students of the Bachelor of Midwifery Program, Faculty of Health Sciences, Universitas Baiturrahmah, Padang. Participants were allocated into two groups of 19 students. One group received iron tablets combined with Galo-Galo honey, while the comparison group received iron tablets. Hemoglobin was measured before and after the intervention using an EasyTouch GCHb device. Results: In the iron tablet plus Galo-Galo honey group, mean hemoglobin increased from 12.4 ± 1.2534 g/dL before intervention to 13.2 ± 1.2810 g/dL after intervention, representing a mean increase of 0.8 g/dL ($p<0.001$). In the iron-tablet group, mean hemoglobin increased from 11.9 ± 0.957 g/dL to 12.6 ± 0.875 g/dL, representing a mean increase of 0.7 g/dL ($p<0.001$). Conclusion: Both interventions were associated with significant increases in hemoglobin levels. The observed increase was numerically greater in the combination group; however, the source document does not report a statistical test directly comparing the magnitude of hemoglobin change between groups. Further controlled studies with larger samples are required to establish the additional effect of Galo-Galo honey beyond iron supplementation.
Keywords: *Galo-Galo honey; iron tablets; hemoglobin; anemia; female students*

INTRODUCTION

Anemia is a global public health problem affecting low-, middle-, and high-income countries. Women of reproductive age are particularly vulnerable, and iron deficiency is considered a major nutritional contributor to anemia. The source research notes that anemia in adolescent girls and young women is associated with fatigue, reduced concentration, impaired academic performance, and decreased quality of life.

Female adolescents and young women have increased susceptibility to anemia because iron requirements are influenced by growth, menstrual blood loss, dietary patterns, and nutritional status. Irregular eating habits, inadequate consumption of iron-rich foods, and intake of beverages that may inhibit iron absorption can further contribute to low hemoglobin levels. In Indonesia, iron tablet supplementation is an established strategy for preventing and controlling iron-deficiency anemia among adolescent girls and women of reproductive age.

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Despite iron supplementation programs, adherence and complementary nutritional approaches remain important. Honey has been considered as a natural food product with nutritional and bioactive components. Galo-Galo honey, produced by stingless bees, is described in the source study as containing minerals, vitamins, enzymes, and antioxidant compounds. The research rationale proposes that these constituents may support nutritional status and potentially contribute to hemoglobin formation when used alongside standard iron supplementation.

A preliminary survey reported in the source study identified anemia among female students in the Bachelor of Midwifery Program at Universitas Baiturrahmah. This finding provided the basis for evaluating a locally available complementary food intervention. Therefore, this study aimed to assess changes in hemoglobin levels following supplementation with Galo-Galo honey combined with iron tablets and to compare these observations with iron-tablet supplementation alone.

METHODS

Study Design and Setting

This quantitative intervention study used a pre-experimental pretest-posttest approach with two groups. It was conducted among female students of the Bachelor of Midwifery Program, Faculty of Health Sciences, Universitas Baiturrahmah, Padang, Indonesia.

Participants and Sampling

The study population consisted of female midwifery students from the 2023 and 2024 cohorts. A total of 38 participants were included, with 19 participants in each intervention group. The source document describes sampling as involving the accessible study population and lists eligibility criteria including willingness to participate, willingness to consume Galo-Galo honey during the intervention, preference for Galo-Galo honey, and normal body mass index. Exclusion criteria included adverse gastrointestinal symptoms, chronic infectious disease, malignancy, menstruation at the time of hemoglobin measurement, and non-adherence to the honey intervention.

Intervention

Participants in the combination group received iron tablets together with Galo-Galo honey, whereas participants in the comparison group received iron tablets. The intervention was conducted for two weeks. The source document contains inconsistent descriptions of the exact honey dosing schedule in different sections; therefore, the dose is not restated as a definitive protocol in this manuscript draft pending verification from the original study log/protocol.

Hemoglobin Measurement

Hemoglobin concentration was assessed before and after the intervention using the EasyTouch GCHb system. Capillary blood was obtained by finger prick using standard lancet and alcohol-swab procedures, and hemoglobin values were recorded in g/dL.

Statistical Analysis

The analysis included descriptive statistics for hemoglobin concentrations before and after intervention and within-group testing of pretest-posttest differences. Statistical significance was defined as $p<0.05$. The source results report $p=0.000$; in this manuscript this is reported according to standard scientific

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convention as p<0.001. A direct inferential comparison of the change in hemoglobin between the two groups was not available in the source results.

RESULTS

Changes in Hemoglobin Levels

Thirty-eight female midwifery students participated in the study, with 19 participants in the iron tablet plus Galo-Galo honey group and 19 in the iron-tablet group. Both groups showed higher mean hemoglobin concentrations after the intervention.

Group	n	Pretest Hb, mean ± SD (g/dL)	Posttest Hb, mean ± SD (g/dL)	Mean change (g/dL)	Within-group p-value
Iron tablets + Galo-Galo honey	19	12.4 ± 1.2534	13.2 ± 1.2810	+0.8	<0.001
Iron tablets	19	11.9 ± 0.957	12.6 ± 0.875	+0.7	<0.001

The combination group demonstrated an increase in mean hemoglobin from 12.4 g/dL to 13.2 g/dL, corresponding to an absolute increase of 0.8 g/dL. The iron-tablet group increased from 11.9 g/dL to 12.6 g/dL, corresponding to an absolute increase of 0.7 g/dL. Within-group analyses were statistically significant in both groups (p<0.001).

DISCUSSION

The findings indicate that hemoglobin levels increased after two weeks of intervention in both groups. This pattern is consistent with the physiological role of iron in hemoglobin synthesis and with the use of iron supplementation as a principal strategy for preventing and treating iron-deficiency anemia. The source thesis also compares these findings with previous studies reporting increases in hemoglobin after iron-tablet supplementation among adolescent girls.

The combination of iron tablets and Galo-Galo honey was associated with a mean increase of 0.8 g/dL, compared with 0.7 g/dL in the iron-tablet group. The source thesis interprets Galo-Galo honey as a potentially useful complementary nutritional intervention because honey contains minerals, vitamins, and antioxidant compounds. It also cites earlier work on stingless-bee honey and other honey interventions in which hemoglobin increased following supplementation.

Nevertheless, the magnitude of the observed difference in change between the two study groups was only 0.1 g/dL. The available source results provide statistical significance for pretest-posttest changes within each group but do not provide an inferential test comparing the change scores between groups. Consequently, the present findings support the conclusion that the combination intervention was associated with increased hemoglobin, but they do not by themselves establish that adding Galo-Galo honey is statistically superior to iron tablets alone.

This distinction is important because baseline mean hemoglobin also differed between groups (12.4 versus 11.9 g/dL). A stronger comparative analysis

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would test the between-group difference in change scores or use an analysis that accounts for baseline hemoglobin. Future randomized controlled studies with larger samples, standardized honey dosing, assessment of dietary iron intake and menstrual blood loss, and laboratory biomarkers of iron status would provide stronger evidence regarding the independent contribution of Galo-Galo honey.

CONCLUSION

Supplementation with iron tablets combined with Galo-Galo honey was associated with a significant increase in mean hemoglobin among female midwifery students, from 12.4 to 13.2 g/dL. Iron-tablet supplementation alone was also associated with a significant increase, from 11.9 to 12.6 g/dL. Although the absolute increase was slightly greater in the combination group (0.8 vs. 0.7 g/dL), the available results do not include a direct statistical comparison of the change between groups. Accordingly, Galo-Galo honey may be considered a promising complementary nutritional intervention, but its additional efficacy beyond iron supplementation requires confirmation in adequately powered controlled trials.

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