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RESEARCH ARTICLES

Apis cerana Honey as a Holistic Solution for Postpartum Blues: A Local Culture–Based Mental Health Approach in Lampung

Madu Apis cerana sebagai Solusi Holistik untuk Postpartum Blues: Pendekatan Kesehatan Mental Berbasis Budaya Lokal di Lampung

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Abstract

Postpartum blues is a common psychological condition occurring after childbirth and can negatively affect maternal and infant well-being. A holistic approach based on local wisdom offers a comprehensive and culturally appropriate alternative for its management. This study aimed to identify secondary metabolites, determine the total saponin content of local *Apis cerana* honey from Lampung, and evaluate its effect on postpartum blues symptoms among postpartum mothers. The study combined a laboratory experimental approach with a quasi-experimental pretest–posttest control group design. Local *Apis cerana* honey samples were qualitatively analyzed for secondary metabolites through phytochemical screening for alkaloids, flavonoids, tannins, and saponins using standard reagents. Total saponin content was quantitatively analyzed using UV–Vis spectrophotometry. A total of 56 postpartum mothers (28 per group) were selected using accidental sampling at Pringsewu Public Health Center. Both groups received standard postpartum care, while the intervention group additionally consumed 15 mL of honey daily for seven days. Postpartum blues was assessed using the Edinburgh Postnatal Depression Scale (EPDS). Phytochemical screening indicated the presence of alkaloids, flavonoids, and saponins (0.43%). The intervention group showed a significant decrease in EPDS scores from 10.04 ± 2.659 to 8.82 ± 2.709 ($p < 0.001$), whereas the control group showed no significant change ($p = 0.882$). The reduction was significantly greater in the intervention group ($p < 0.001$). *Apis cerana* honey contained bioactive compounds and showed potential as a complementary therapy for reducing postpartum blues symptoms.

Keywords: antioxidants, flavonoids, honey, local wisdom, postpartum blues

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Abstrak

Postpartum blues merupakan kondisi psikologis yang umum terjadi setelah persalinan dan dapat berdampak negatif pada kesejahteraan ibu dan bayi. Pendekatan holistik berbasis kearifan lokal menawarkan alternatif yang lebih komprehensif dan sesuai secara budaya dalam penanganannya. Penelitian ini bertujuan untuk mengidentifikasi kandungan metabolit sekunder, menentukan kadar total saponin pada madu lokal Apis cerana asal Lampung, serta mengevaluasi pengaruhnya terhadap kejadian postpartum blues pada ibu nifas. Penelitian ini mengombinasikan pendekatan eksperimen laboratorium dan quasi-eksperimen dengan desain pretest–posttest control group design. Sampel madu lokal Apis cerana dianalisis untuk mengidentifikasi kandungan metabolit sekunder secara kualitatif melalui uji fitokimia terhadap alkaloid, flavonoid, tanin, dan saponin menggunakan pereaksi standar. Selanjutnya dilakukan analisis kuantitatif kadar total saponin menggunakan spektrofotometri UV–Vis. Sebanyak 56 ibu nifas (28 per kelompok) dipilih dengan teknik accidental sampling di Puskesmas Pringsewu. Kedua kelompok mendapatkan perawatan standar postpartum, sementara kelompok intervensi mengonsumsi tambahan 15 mL madu setiap hari selama tujuh hari. Postpartum blues diukur menggunakan Edinburgh Postnatal Depression Scale (EPDS). Hasil skrining fitokimia menunjukkan adanya alkaloid, flavonoid, dan saponin (0,43%). Kelompok intervensi menunjukkan penurunan skor EPDS yang signifikan dari 10,04 ± 2,659 menjadi 8,82 ± 2,709 ($p < 0,001$), sedangkan kelompok kontrol tidak menunjukkan perubahan signifikan ($p = 0,882$). Penurunan skor lebih besar secara signifikan pada kelompok intervensi ($p < 0,001$). Madu Apis cerana mengandung senyawa bioaktif dan berpotensi sebagai terapi komplementer yang efektif dalam menurunkan gejala postpartum blues.

Kata Kunci: *antioksidan, flavonoid, kearifan lokal, madu, postpartum blues*

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Highlight:

- Apis cerana honey contained bioactive compounds, including alkaloids, flavonoids, and saponins, with a total saponin content of 0.43%.
- Daily consumption of Apis cerana honey was associated with a reduction in postpartum blues symptoms, as reflected by lower EPDS scores after the intervention.
- The intervention group showed an improvement in EPDS categories, with more mothers classified in the normal category and fewer in the possible depression category after the intervention, while similar improvement was not observed in the control group.

INTRODUCTION

Postpartum blues is a mood disorder experienced by approximately 70–80% of mothers after childbirth, characterized by symptoms such as frequent crying, rapid emotional changes, anxiety, and excessive fatigue (Manurung and Setyowati, 2021; Novinaldi et al., 2020; Silbert-Flagg and Pillitteri, 2018). The prevalence of postpartum blues in Asia is relatively high, with varying rates across countries ranging from approximately 26% to 85% (Retnosari and Fatimah, 2022). In Indonesia, the prevalence

of postpartum blues is relatively high, ranging from 37% to 67% (Safaringga et al., 2023). The results of a preliminary study conducted in five regencies of Lampung Province showed that 55.6% of postpartum mothers experienced postpartum blues. If not properly managed, this condition may progress to postpartum depression and even psychosis, with an estimated prevalence of 15–20% (Safaringga et al., 2023).

Unfortunately, according to the World Health Organization (WHO), attention to postpartum health care services remains far behind compared with antenatal and perinatal care (Corrigan et al., 2015). The exact cause of postpartum blues has not been specifically identified; however, various studies indicate an association with hormonal an association with hormonal changes, physical fatigue, psychosocial stress, and lack of family support (Astari and Dewi, 2019; Mones et al., 2023).

Current management of postpartum blues mainly consists of supportive care, including psychological support, education, adequate rest, breastfeeding support, and strengthening family involvement, in line with WHO recommendations for postnatal care and maternal mental health. However, complementary interventions that are safe, culturally acceptable, and easily accessible are still needed to support maternal emotional well-being during the postpartum period. In Indonesia, local wisdom refers to traditional knowledge, practices, and the utilization of local natural resources that have been preserved and passed down through generations to maintain health and well-being. One example is the traditional cultivation and use of *Apis cerana* honey by communities in Lampung Province. Previous studies have reported that *Apis cerana* honey contains bioactive compounds, including flavonoids, phenolic compounds, with antioxidant and anti-inflammatory properties (Jaitham et al., 2025). These compounds may contribute to improved emotional well-being by modulating oxidative stress and inflammatory pathways associated with mood-related symptoms, although direct clinical evidence in postpartum women remains limited (Ferrassi et al., 2026). Therefore, the utilization of locally produced *Apis cerana* honey represents a culturally relevant, affordable, and potentially sustainable complementary intervention that may support postpartum maternal health.

Therefore, alternative interventions that are more natural, safe, and affordable are needed, particularly those that can be applied within the context of local culture. The use of natural products as complementary therapy in mental health care has gained increasing attention. In this context, the management of postpartum blues requires a holistic approach that not only involves medical and psychological aspects but also integrates local wisdom as a form of culturally based care (Kołomańska-Bogucka and Mazur-Bialy, 2019; Verda and Nuraidha, 2022). One form of local wisdom–based natural resource with potential as a holistic therapy is honey, particularly local *Apis cerana* honey traditionally cultivated by the Lampung community. *Apis cerana* honey contains various bioactive compounds such as flavonoids, phenolic compounds, and enzymes, which are known to exhibit antioxidant and anti-inflammatory activities, as well as to support nervous system health and mood regulation (Pemayun et al., 2023; Hidayatullah et al., 2022; Zulkifli et al., 2024). Therefore, the integration of local honey as a natural intervention in postpartum care has the potential to become a more sustainable, affordable, and culturally acceptable innovation.

The management of this condition is still largely limited to conventional medical and psychological approaches, which have not adequately addressed cultural aspects and are not fully accepted by all segments of society. Therefore, alternative management efforts that utilize local wisdom are essential, one of which is through the exploration of natural resources such as honey. The use of honey as a complementary

therapy is considered safer, more natural, and has the potential to support holistic recovery of both physical conditions (including acceleration of perineal wound healing) and maternal emotional well-being (Rusyanti et al., 2025; Alhashem et al., 2025).

Lampung is known as a region producing *Apis cerana* honey with distinctive local flora characteristics, which are believed to influence the honey's bioactive compound content. Therefore, research on the potential of locally produced *Apis cerana* honey as a natural intervention for managing postpartum blues is important because it supports the development of holistic postpartum care based on the traditional utilization of *Apis cerana* honey by the Lampung community.

METHODS

This study consisted of two phases: a laboratory experimental study and a quasi-experimental study using a pretest–posttest control group design. The laboratory experimental phase was conducted in June 2025. The laboratory phase was conducted to identify secondary metabolites and determine the total saponin content of the honey sample. Honey samples were subjected to qualitative screening of secondary metabolites, including alkaloids, phenolics, flavonoids, terpenoids, saponins, and tannins, using standard phytochemical methods (Anandi et al., 2021; Handayani et al., 2017; Rasyiid and Susandarini, 2020; Saeed et al., 2012). The presence of each compound was identified based on characteristic color changes or precipitate formation following the addition of specific reagents. Total saponin content was determined quantitatively using UV–Vis spectrophotometry. Absorbance readings were converted to saponin concentration (ppm) using a standard curve, and the results were expressed as the percentage of total saponin content (%) relative to sample weight. Measurements were performed in triplicate to assess the accuracy and consistency of the results. The results of the secondary metabolite screening and total saponin analysis were presented descriptively.

The quasi-experimental study was conducted among postpartum mothers at Midwife Independent Practices *(Praktik Mandiri Bidan, PMB)* within the working area of Pringsewu Health Center, Pringsewu Regency, from July to October 2025. The population consisted of postpartum mothers on the first day after delivery who met the inclusion and exclusion criteria. The inclusion criteria were mothers with a history of normal pregnancy and delivery who were willing to participate as study subjects. The exclusion criteria were a history of, or current, mental health problems. Participants who did not complete the study or experienced postpartum complications were considered dropouts. Participants were recruited using accidental sampling. Allocation to the intervention and control groups was non-random and was determined by the study site and the data collection period at the participating PMBs within the working area of Pringsewu Health Center. Both groups received standard postpartum care, while the intervention group additionally received 15 mL of honey daily for seven consecutive days.

Depressive symptoms consistent with postpartum blues were assessed using the Indonesian version of the Edinburgh Postnatal Depression Scale (EPDS). The EPDS consists of 10 self-report items, with a total score ranging from 0 to 30; higher scores indicate more severe depressive symptoms. For descriptive analysis, EPDS scores were categorized as a negative screen/no clinically significant depressive symptoms (0–9), at-risk or borderline depressive symptoms (10–12), and probable depression (≥13). This categorization was based on commonly used EPDS thresholds, with a score of 10 or

above indicating a positive depression screen and a score of 13 or above indicating a higher likelihood of clinically significant depression. The Indonesian version of the EPDS has been adapted and evaluated for use among Indonesian pregnant women (Paramita et al., 2020) and has also been reported as valid and reliable for screening maternal depressive symptoms in Indonesia, with prior evidence indicating a sensitivity of 96% and specificity of 82% at a cutoff score of 10 (Adli, 2022).

Baseline demographic and obstetric characteristics were collected to assess the comparability of the intervention and control groups. Although participants were recruited on the first day after delivery, the baseline EPDS assessment was performed at 7 days postpartum, prior to the intervention. The intervention group received 15 mL of honey daily for seven days, while the control group continued to receive standard postpartum care. EPDS assessment was repeated at 14 days postpartum to evaluate changes in depressive symptoms. At follow-up, postpartum blues and postpartum depression were assessed using the EPDS (Desiana and Tarsikah, 2021).

Data were checked for completeness and analyzed using IBM SPSS Statistics version 24. Categorical variables were presented as frequencies and percentages, whereas continuous variables were expressed as mean ± standard deviation (SD). Data normality was assessed using the Kolmogorov–Smirnov test. Baseline categorical variables were compared between groups using the Chi-square test. Changes in EPDS scores within each group between pretest and posttest were analyzed using the paired *t*-test. To evaluate the intervention effect between groups, the change in EPDS score (Δ = pretest − posttest) was calculated for each participant. Because the distribution of the change scores was not normally distributed, the mean ranks of the change scores between the intervention and control groups were compared using the Mann–Whitney U test. A two-sided p-value < 0.05 was considered statistically significant. Ethical approval was obtained from the Health Research Ethics Committee of the University of Muhammadiyah Pringsewu (No. 0521/KEPK/FKes/2025). The study was not prospectively registered in a clinical trial registry.

RESULTS AND DISCUSSIONS

Phytochemistry of *Apis cerana* honey

The health potential of *Apis cerana* honey was evaluated through phytochemical analysis to identify its secondary metabolite content. This analysis included qualitative detection of major compound groups such as alkaloids, phenolics-flavonoids, saponins, and tannins. The results of this analysis are presented in Table 1.

Based on Table 1 the results of the qualitative phytochemical test on *Apis cerana* honey indicate that the honey contains several groups of bioactive compounds. The tests showed positive results for alkaloids, flavonoids, and saponins. Saponins were detected, as evidenced by the formation of a stable foam in the Froth test. Additionally, flavonoids tested positive using the Bate-Smith and Metcalf method, producing red, yellow, and orange colors. Finally, the test for tannins using $FeCl_3$ reagent showed negative results, indicated by color changes to dark bluish-green and dark brown.

Table 1. Phytochemical test results of *Apis cerana* honey

Sample	Compound Tested	Reagent	Reference Observation	Result	Remark
Apis cerana	Alkaloids	Mayer	White/yellowish precipitate	Brown precipitate	(+)

Sample	Compound Tested	Reagent	Reference Observation	Result	Remark
Apis cerana	Alkaloids	Wagner	Precipitate formation	No precipitate	(−)
Apis cerana	Alkaloids	Dragendorff	Brown/yellow precipitate	Brown precipitate	(+)
Apis cerana	Flavonoids	Bate-Smith & Metcalf method	Dark red–orange and yellow coloration	Yellow	(+)
Apis cerana	Tannins	$FeCl_3$ (+)	Bluish-green color	Dark brown	(−)
Apis cerana	Saponins	Froth Test	Stable foam	Stable foam	(+)

Source: Primary data, 2025

The presence of these compounds, particularly flavonoids and alkaloids, is highly relevant due to their potential benefits in alleviating anxiety (Khaled et al., 2025). Flavonoids are well known for their calming effects on the central nervous system and may act as natural anxiolytic agents. Phenolic and flavonoid components in honey are likely to contribute to reducing cortisol levels by modulating the hypothalamic-pituitary-adrenal (HPA) axis, the brain's stress-response pathway, thereby lowering cortisol and enhancing antioxidant defenses (Khaled et al., 2025; Mando et al., 2024). These compounds act by modulating receptors in the brain responsible for regulating mood and stress. Similarly, certain types of alkaloids and saponins have been shown to exhibit pharmacological activity affecting neurological function, which may help alleviate anxiety symptoms and provide a relaxation effect.

The presence of flavonoids and polyphenols in *Apis cerana* honey may underlie its potential neuropsychological benefits (Iftikhar et al., 2022; Jaitham et al., 2025). Flavonoids in honey have been reported to cross the blood-brain barrier and influence central neurotransmission, particularly serotonergic and GABAergic pathways involved in mood regulation and anxiety control (Zamri et al., 2023). In addition, oxidative stress and neuroinflammation are key mechanisms in mood disorders; emerging evidence links them to postpartum depression pathophysiology. Accordingly, the antioxidant activity of honey-derived phytochemicals supports emotional recovery by attenuating oxidative damage and neuroinflammatory responses in the CNS (Jaitham et al., 2025; Zulkifli et al., 2023). Collectively, these findings indicate that the phytochemical composition of *Apis cerana* honey may contribute to physical restoration (anti-inflammatory, wound healing) and emotional stabilization (antianxiety, antidepressant) after childbirth.

Total saponin of *Apis cerana* honey

Table 2 presents the results of the quantitative test to determine the total saponin content in *Apis cerana* honey. This test was performed in triplicate to ensure the accuracy and consistency of the data obtained. The absorbance values from the three replicates were highly consistent, with 0.0120 for the first and third replicates and slightly higher at 0.0130 for the second replicate. Using the standard curve, these absorbance values corresponded to a total saponin content of 0.418% for the first and third replicates and 0.448% for the second. The average of the three measurements yielded a representative total saponin content of 0.43% in *Apis cerana* honey. This percentage is based on initial saponin concentrations ranging from 23.000 to 24.667

ppm (parts per million).

Table 2. Results of total saponin analysis of *Apis cerana* honey

Sample	Test	Absorbance	Initial Saponin Content (ppm)	Total Saponin (%)	Average Total Saponin (%)
Apis cerana	1	0.0120	23.000	0.418	0.43
	2	0.0130	24.667	0.448	
	3	0.0120	23.000	0.418	

Source: Primary data, 2025

The quantified total saponin content of 0.43% provides preliminary evidence of the presence of saponins in *Apis cerana* honey. In other experimental studies, certain saponins have been investigated for antioxidant, anti-inflammatory, neuroprotective, and antidepressant-like activities (Sun et al., 2014; Abbas et al., 2015). These mechanisms are potentially relevant to postpartum depression because oxidative stress, inflammatory processes, and dysregulation of the hypothalamic–pituitary–adrenal (HPA) axis have been proposed as biological factors associated with postpartum depressive symptoms (Prasoona et al., 2023). However, the present study only quantified total saponin content and did not identify individual saponin compounds or evaluate their bioavailability. In addition, no oxidative-stress markers, inflammatory markers, neurotransmitter activity, HPA-axis function, cortisol levels, or postpartum depression-related outcomes were assessed. Therefore, the measured saponin content should not be interpreted as evidence that *Apis cerana* honey can prevent, reduce, or treat postpartum depression. Further compound characterization and appropriately designed biological, preclinical, and clinical studies are needed to assess its potential relevance to postpartum mental health.

Characteristics of *Apis cerana* honey intervention subjects

Data collection was successfully completed according to the predetermined sample target. A total of 28 subjects were collected for the intervention group and 28 subjects for the control group. A comprehensive overview of the findings is presented in Table 3 below:

Table 3. Characteristics of subjects

Characteristics	Intervention Group		Control Group		Mean ± SD
	n	%	n	%	
Age					
20–35 years	24	85.7	23	82.1	31.09 ± 4.113
<20 or >35 years	4	14.3	5	17.9	
Parity					
Primiparous	6	21.4	6	21.4	
Multiparous	20	71.4	18	64.3	2.69 ± 1.336
Grand multiparous	2	7.1	4	14.3	
Education					
Senior High School	15	53.6	13	46.4	
Higher Education	13	46.4	15	53.6	
Occupation					

Characteristics	Intervention Group		Control Group		Mean ± SD
	n	%	n	%	
Employed	13	46.4	16	57.1	
Unemployed	15	53.6	12	42.9	
Total	**28**	**100**	**28**	**100**	

Source: Primary data, 2025

Based on Table 3. the characteristics of subjects in the intervention group (N = 28) and control group (N = 28) were largely similar. Most subjects in both the treatment and control groups were aged 20–35 years, accounting for 85.7% and 82.1%, respectively, with a mean age of 31.09 ± 4.113 years. Regarding parity, the majority of subjects in both groups were multiparous, with 71.4% in the intervention group and 64.3% in the control group, and a mean parity of 2.69 ± 1.336. In terms of educational level, most subjects in the intervention group had a high school education (53.6%), whereas the majority in the control group had a Higher Education (53.6%). Regarding employment status, over half of the intervention group were unemployed (53.6%), while most subjects in the control group were employed (57.1%).

The social and mental condition of a new mother has a significant impact on her emotions after childbirth. Becoming a mother, especially in early adulthood, is a challenging period of adaptation due to many new roles and pressures. This risk may be higher for housewives, who may feel isolated due to the loss of social interaction at work and a daily routine centered solely on the child. The combination of adaptation stress and limited external support often triggers stress and anxiety, which are the main symptoms of postpartum blues (Mones et al., 2023). In addition, the number of children is also a strong determining factor (Yolanda et al., 2024; Yulaikah et al., 2024). Mothers who already have children often bear an accumulated and heavier burden. The increased responsibilities of caring for a newborn, while also attending to older children, can lead to extreme fatigue. This exhaustion drains a mother's energy, making her more prone to sadness, irritability, and emotional sensitivity. In essence, the more children a mother has to care for, the harder it is to maintain emotional stability.

These factors do not occur in isolation; rather, they compound one another. Stress from feelings of isolation and the need to adapt to new roles is exacerbated when the body is already exhausted from caring for multiple children. When physical and mental energy is depleted, the body's natural defenses against stress decline drastically. These factors act as triggers for postpartum blues symptoms and highlight the critical importance of comprehensive support for mothers, especially those carrying a dual burden within the family.

EPDS scores in the intervention group after the administration of *Apis cerana* honey.

The relatively homogeneous characteristics between the intervention and control groups strengthen the internal validity of the study findings. Similar distributions of age, parity, education level, and employment status reduce the likelihood that the observed differences in EPDS scores were caused by demographic factors rather than the intervention itself. Previous studies have reported that maternal age, parity, educational attainment, and social support are important determinants of postpartum psychological adaptation. Therefore, the comparable baseline characteristics observed in this study make it less likely that the observed reduction in EPDS scores was driven by these

sociodemographic factors alone. Nevertheless, because allocation to groups was non-random, the possibility of other unmeasured confounding factors cannot be excluded, and the findings should be interpreted as an association rather than definitive proof of a causal effect of honey consumption.

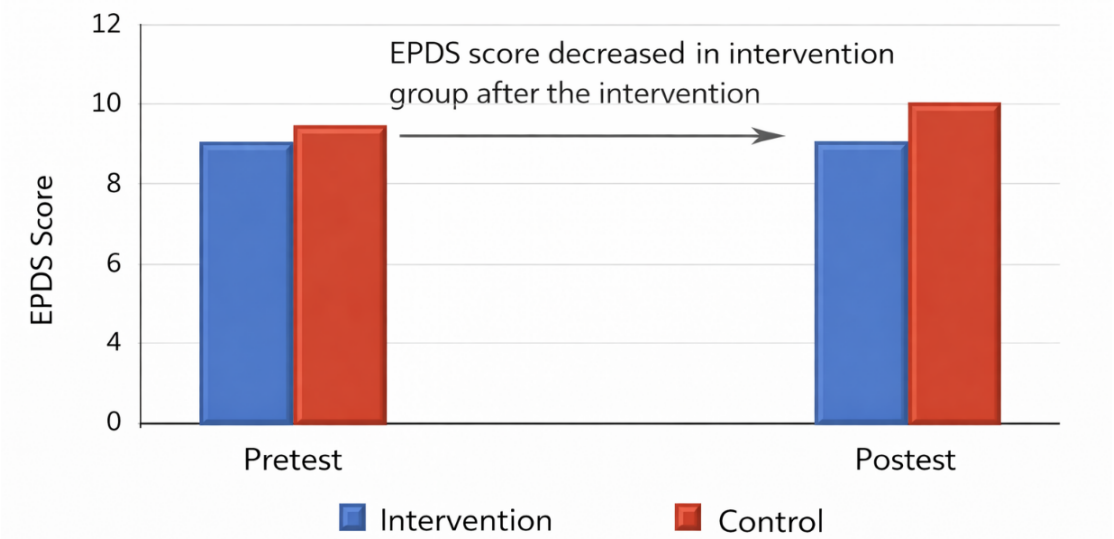

Figure 1. Comparison of EPDS scores between two groups, showing a decrease in EPDS score in the intervention group after the intervention

Figure 1 presents a comparison of the mean EPDS (Edinburgh Postnatal Depression Scale) scores between the treatment and control groups. Measurements were taken at two different time points, before the intervention (pretest) and after the intervention (posttest), to assess the impact of the treatment provided. The results show a marked and contrasting change between the two groups. In the intervention group, there was a significant decrease in the mean EPDS score, from 10.04 at pretest to 8.82 at posttest. This reduction suggests that honey consumption was associated with an improvement in depressive symptoms consistent with postpartum blues in this group, although the quasi-experimental, non-randomized design of this study means the change cannot be attributed to the intervention alone.

The normal, at-risk, and possible depression categories in Figure 2 correspond to the EPDS score ranges of 0–9, 10–12, and ≥13, respectively, as described in the Methods section. Based on Fig. 2. in the intervention group, before the treatment (pretest), the majority of subjects were in the normal category (42.9%), followed by the at-risk category (35.7%) and the possible depression category (21.4%). After the intervention (posttest), the proportion of subjects in the normal category increased to 57.1%, while the possible depression category decreased to 7.1%, and the at-risk category remained at 35.7%. In the control group, before measurement (pretest), most subjects were in the normal category (42.9%), followed by possible depression (32.1%) and at-risk (25%). After measurement (posttest), the proportion of subjects in the normal category decreased to 32.1%, the at-risk category increased to 42.9%, and possible depression decreased slightly to 25%. Overall, there was an improvement in EPDS score categories in the intervention group after the treatment, whereas the control group did not show a similar improvement.

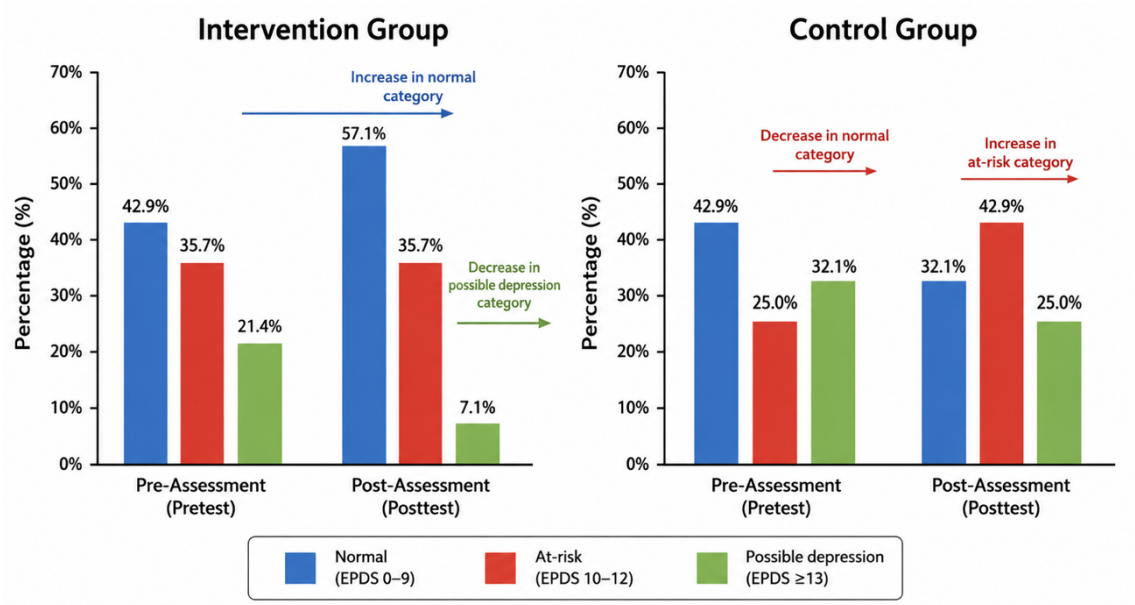

Figure 2. EPDS score categories before and after the intervention in the treatment and control groups, with reduced risk and likelihood of depression observed in the intervention group

The effect of *Apis cerana* honey on postpartum blues symptoms

Based on Table 4, the mean EPDS score in the intervention group decreased from 10.04 ± 2.659 at pretest to 8.82 ± 2.709 at posttest, with a mean difference of 1.214. The paired *t*-test showed a statistically significant reduction in EPDS scores ($p = 0.001$; $p < 0.05$), indicating a significant decrease in postpartum blues symptoms following consumption of *Apis cerana* honey. In the control group, the mean EPDS score remained relatively unchanged, from 10.68 ± 2.919 at pretest to 10.71 ± 2.191 at posttest, with a mean difference of 0.035. The paired *t*-test showed no statistically significant change ($p = 0.882$; $p > 0.05$). Further analysis using the Mann–Whitney U test of the change in EPDS scores (Δ = pretest − posttest) showed a statistically significant difference between the intervention and control groups ($p = 0.001$; $p < 0.05$), indicating that the reduction in EPDS scores was significantly greater in the intervention group than in the control group. These findings suggest that consumption of *Apis cerana* honey was associated with a greater reduction in postpartum blues symptoms among postpartum mothers in this study. However, because group allocation was non-random, these findings should be interpreted as an association rather than definitive evidence of a causal treatment effect.

Table 4. Analysis of the effect of *Apis Cerana* honey on postpartum blues symptoms

Group	Pretest (Mean ± SD)	Posttest (Mean ± SD)	Mean Difference	*p-value*[a]
Intervention	10.04 ± 2.659	8.82 ± 2.709	1.214	0.001*
Control	10.68 ± 2.919	10.71 ± 2.191	0.030	0.882*
p-value				0.001**

Note: *Paired t-test; **Mann–Whitney U test, significance level if p-value < 0.05

The control group, which did not receive the honey intervention, showed a slight

increase in mean EPDS scores from pretest to posttest; however, this change was not statistically significant (p = 0.882). In contrast, the intervention group showed a significant decrease in mean EPDS scores following consumption of *Apis cerana* honey (p = 0.001). The graph illustrates a decrease in mean EPDS scores in the intervention group and a slight increase in the control group. The between-group analysis using the Mann–Whitney U test also demonstrated a significant difference in changes in EPDS scores (p = 0.001), indicating that the reduction in depressive symptoms was greater in the intervention group than in the control group. These findings suggest that honey consumption was associated with a greater reduction in depressive symptoms consistent with postpartum blues. Nevertheless, because the study used a quasi-experimental design with non-random group allocation, the findings should not be interpreted as definitive evidence of a causal treatment effect.

The reduction in EPDS scores observed in the intervention group may have practical relevance for postpartum mental health. Postpartum blues is a common emotional disturbance during the early postpartum period and may be associated with an increased risk of subsequent postpartum depression. Early identification and appropriate support during the postpartum period are therefore important for addressing psychological distress and reducing the potential risk of progression to more persistent depressive symptoms. The findings of this study suggest that daily consumption of *Apis cerana* honey may have potential as a simple and culturally acceptable complementary approach to support maternal emotional well-being. As a dietary intervention, honey may provide an accessible complementary option; however, its safety and suitability should be considered individually, particularly among breastfeeding mothers. Further randomized controlled studies with larger sample sizes and longer follow-up periods are needed to confirm these findings and clarify the potential mechanisms underlying the observed association.

Another possible explanation for the observed improvement involves the interaction between oxidative stress and postpartum mood disturbances. Several studies have reported that increased oxidative stress and systemic inflammation contribute to depressive symptoms by disrupting neurotransmitter metabolism and neuroplasticity (Zhu et al., 2022). Honey is recognized as a rich source of phenolic compounds and flavonoids with substantial antioxidant capacity (Iftikhar et al., 2022). By scavenging reactive oxygen species and reducing inflammatory responses, honey may help preserve neuronal function and improve emotional resilience during the postpartum period. Consequently, the psychological benefits observed in this study may arise from both neurochemical modulation and antioxidant-mediated neuroprotection.

The marked reduction in postpartum blues scores in mothers who consumed honey can be scientifically explained by the synergistic action of its phytochemical components. Flavonoids, as the main component, play a dual and crucial role. First, as potent anti-inflammatory and antioxidant agents, flavonoids accelerate postpartum physical recovery by reducing inflammation and pain. This reduction in physical stress directly alleviates the psychological burden on the mother. Second, and more importantly, flavonoids are known for their neuroprotective and natural antidepressant effects. These compounds can modulate neurotransmitter systems in the brain, such as serotonin, which plays a key role in mood regulation (Singla et al., 2025; Ullah et al., 2020). By maintaining chemical balance in the brain, flavonoids actively counteract mood swings, irritability, and feelings of sadness, which are the core symptoms of postpartum blues.

This effect may be further supported by saponins and alkaloids, based on

mechanisms reported in previous studies rather than measurements performed here. Saponins, which also possess anti-inflammatory properties, have been reported to act alongside flavonoids to accelerate healing and reduce physical discomfort. In addition, saponins may exhibit adaptogenic effects, potentially helping the body adapt and build resilience to physical and emotional stress (Abbas et al., 2014). Meanwhile, naturally occurring alkaloids in safe doses may provide a calming effect on the central nervous system, potentially helping reduce anxiety, soothe the mind, and improve sleep quality-factors that could be relevant for postpartum mothers who are vulnerable to fatigue. Taken together, these findings suggest that the reduction in postpartum blues scores observed in this study may plausibly relate to the combined presence of flavonoids, saponins, and alkaloids in the honey; however, this study did not directly measure these biochemical pathways, and the proposed mechanisms remain hypothetical and warrant further investigation. The control group showed a greater improvement in EPDS scores than the control group, consistent with a possible complementary contribution of these bioactive compounds.

CONCLUSIONS

Apis cerana honey consumption was associated with a reduction in postpartum blues symptoms in postpartum mothers and has the potential to be used as a complementary, locally based intervention in promoting and preventing postpartum mental health issues.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this paper. The research was conducted without any commercial or financial relationships that could be construed as a potential conflict of interest.

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