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Broad Assessment of Health Influences From Combined Probiotic Blends and Assorted Plant Extracts in Adult Populations

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ABSTRACT

***Background**: Growing interest in natural, non-pharmaceutical approaches to health has led to increased use of supplements combining probiotics with plant extracts. These formulations are often marketed for general wellness, yet scientific evaluation of their nonspecific health effects in healthy adults remains limited. Objective: To explore how daily supplementation with combined probiotic blends and assorted plant extracts may be associated with nonspecific health improvements in a healthy adult population. Methods: This descriptive, non-controlled study was conducted over four months in South Punjab, enrolling 100 healthy adults aged 25–55. Participants consumed a daily capsule containing a multi-strain probiotic and standardized plant extract blend. Self-reported health indicators were measured at baseline, 8 weeks, and 16 weeks using validated tools: WHO-5 Well-Being Index, Gastrointestinal Symptom Rating Scale (GSRS), and visual analog scales (VAS) for energy levels and sleep quality. Paired t-tests and repeated measures ANOVA were used for statistical analysis ($p < 0.05$). Results: Ninety-two participants completed the study. WHO-5 scores increased significantly from 58.4 ±12.3 at baseline to 72.5 ±9.4 at 16 weeks ($p < 0.001$), reflecting improved psychological well-being. GSRS scores decreased from 2.9 ±0.6 to 1.7 ±0.4 ($p < 0.001$), indicating reduced gastrointestinal discomfort. Energy levels rose from 5.1 ±1.2 to 7.4 ±0.9, and sleep quality improved from 5.4 ±1.3 to 7.6 ±1.0 by study end. No adverse effects were reported. Conclusion: Combined supplementation with probiotics and plant extracts may support nonspecific health improvements in healthy adults. These findings provide preliminary support for multi-ingredient natural products as potential contributors to general wellness.*

Keywords

INTRODUCTION

The human gut is increasingly recognized as a complex ecosystem with a central role in maintaining overall health, far beyond digestion alone. Advances in microbiome research have revealed the intimate connection between gut microbial balance and various physiological systems, including immunity, metabolism, and even mental well-being (1). As interest grows in non-pharmaceutical methods for supporting health, probiotics—live microorganisms that, when administered in adequate amounts, confer health benefits to the host—have emerged as one of the most studied and widely consumed supplements (2). However, while probiotics are often explored individually or in simple formulations, real-world applications more frequently involve complex blends, often combined with botanicals or plant extracts. This emerging synergy presents a new frontier in nutritional science that remains underexplored. The rationale for combining probiotic strains with plant extracts lies in their potentially complementary mechanisms of action (3). Probiotics work primarily by enhancing gut microbial diversity, modulating immune function, and promoting barrier integrity, whereas plant-derived compounds such as polyphenols, flavonoids, and terpenes offer antioxidant, anti-inflammatory, and antimicrobial effects. Together, these bioactive substances may engage in a multidirectional interaction within the gastrointestinal tract, creating an environment more conducive to microbial balance and systemic resilience. Yet, despite the theoretical promise of these combinations, the literature remains relatively sparse in terms of broad, descriptive evaluations of their influence on general health—particularly when considering combinations rather than isolated ingredients (4).

Much of the existing research in this domain is highly targeted, often assessing a specific strain or compound in relation to a narrow health marker—such as the effect of Lactobacillus rhamnosus on antibiotic-associated diarrhea or curcumin's influence on inflammatory markers (5). While such studies are important, they may not fully capture the broader, systemic benefits that may emerge from more comprehensive, multi-ingredient interventions (6). In everyday contexts, individuals do not consume these ingredients in isolation; rather, they gravitate toward products that promise overall wellness through complex, proprietary blends. As such, there is a need to move beyond reductionist models and adopt a more holistic approach to examining how these interventions influence the general health landscape in adult populations. In parallel, there is a growing

public shift toward natural and preventive health strategies, as individuals seek alternatives or complements to conventional medicine (7). With this trend comes a greater demand for empirical evidence supporting the efficacy of wellness supplements, especially those marketed for general or nonspecific benefits like energy, digestion, immunity, and mood. Yet, many such claims remain anecdotal or insufficiently substantiated, particularly when the formulations are multifactorial in nature (8). This disconnect between consumer behavior and scientific validation creates an important gap: how do broad-spectrum probiotic and plant extract blends actually affect health when taken together by generally healthy adults?

A further complication is the subjective and multifaceted nature of "health outcomes" in non-clinical populations. Unlike clinical trials focusing on disease endpoints, studies targeting wellness often rely on self-reported experiences, subtle physiological shifts, or biomarker trends that may not reach statistical thresholds for significance but still reflect meaningful patterns (9). This necessitates a descriptive, exploratory approach—one that can serve as a foundation for more rigorous investigations in the future (10). While it may not be feasible within a single study to unpack the mechanistic intricacies of each component within a multi-ingredient supplement, descriptive studies can provide valuable preliminary insights (11). They can help identify trends, tolerability profiles, and potential areas of benefit that merit deeper investigation. In doing so, such work contributes to a more nuanced understanding of how modern health consumers interact with complex supplements and what outcomes they might reasonably expect (12). Given these considerations, the present study aims to broadly assess the health influences of combined probiotic blends and assorted plant extracts in adult populations. Rather than isolating specific disease outcomes or targeting narrowly defined health parameters, the objective is to explore how these combined interventions may loosely relate to general wellness markers, perceived health improvements, and overall tolerability in a real-world context.

METHODS

This descriptive study was conducted over a four-month period in South Punjab with the primary objective of exploring the potential relationships between the use of combined probiotic blends and assorted plant extracts and nonspecific health outcomes in an adult population. The study was designed to capture generalized trends in perceived health status, wellness indicators, and overall tolerance to the intervention without targeting any disease-specific endpoints. The emphasis was on real-world applicability, and the methodology was structured to reflect naturalistic supplement use patterns. The study population consisted of adults aged 25 to 55 years, recruited from urban and peri-urban areas through community outreach and local health centers. A purposive sampling method was employed to ensure a diverse yet representative cross-section of the general adult population. Inclusion criteria included individuals reporting overall good health at baseline, willingness to adhere to daily supplementation for the duration of the study, and the ability to complete self-administered questionnaires. Participants were excluded if they were currently on antibiotics, immunosuppressive therapy, diagnosed with chronic gastrointestinal disorders, or pregnant or lactating. Based on an estimated effect size of 0.35, a confidence level of 95%, and a statistical power of 0.80, the minimum sample size was calculated to be 86 participants. To account for potential dropouts, a total of 100 individuals were enrolled.

Participants were administered a daily supplement containing a proprietary blend of multi-strain probiotics combined with standardized extracts from selected medicinal plants known for their antioxidant and gut-modulating properties. The composition included strains such as Lactobacillus acidophilus, Bifidobacterium bifidum, and Lactobacillus plantarum, alongside botanical extracts derived from turmeric, ginger, fennel, and green tea. The supplement was provided in capsule form and participants were instructed to take one capsule daily with food for the entire duration of the study. Data collection was performed at three key time points: baseline, mid-point (8 weeks), and completion (16 weeks). Outcome measurements focused on a range of nonspecific health indicators, including digestive comfort, perceived energy levels, sleep quality, mental clarity, and general wellness. These were assessed using validated tools such as the WHO-5 Well-Being Index, the Gastrointestinal Symptom Rating Scale (GSRS), and a modified Visual Analog Scale (VAS) for self-perceived energy and sleep quality. Participants also completed a structured questionnaire designed to capture subjective feedback regarding tolerability and any perceived benefits or adverse effects.

Statistical analysis was conducted using SPSS version 26. Descriptive statistics were applied to characterize the demographic profile and baseline health perceptions of the participants. Paired sample t-tests were used to evaluate changes in outcome measures between baseline and post-intervention time points, assuming normal distribution of the data as confirmed by the Shapiro-Wilk test. Repeated measures ANOVA was used to analyze temporal trends across the three data collection points. A significance threshold of $p < 0.05$ was maintained throughout the analysis. The methodological design, grounded in a naturalistic framework and supported by appropriate measurement tools and statistical tests, aimed to yield preliminary insights into the broader health-related effects of combining probiotic and plant extract supplementation in an everyday adult setting.

RESULTS

The final analysis included data from 92 participants who completed the full 16-week intervention period. The mean age of participants was 39.2 years (SD ± 7.5), with a relatively balanced gender distribution (52% male, 48% female). Sixty percent of participants resided in urban areas, while the remaining 40% were from peri-urban settings (Table 1).

At baseline, the mean WHO-5 Well-Being Index score was 58.4 (SD ± 12.3), indicating a moderate level of psychological well-being. This increased to 67.2 (SD ± 10.8) at 8 weeks and 72.5 (SD ± 9.4) by week 16. The improvement from baseline to 16 weeks was statistically significant ($p < 0.001$), suggesting a notable enhancement in perceived well-being over time (Table 2).

Gastrointestinal comfort, measured using the GSRS, showed a consistent downward trend, indicating symptom relief. Baseline mean score was 2.9 (SD ± 0.6), which declined to 2.3 (SD ± 0.5) at week 8 and further to 1.7 (SD ± 0.4) by the end of the study ($p < 0.001$). These findings reflect a reduction in self-reported gastrointestinal disturbances across the study period (Table 3).

Self-assessed energy levels showed a marked improvement, with mean VAS scores rising from 5.1 (SD ± 1.2) at baseline to 6.8 (SD ± 1.0) at 8 weeks and 7.4 (SD ± 0.9) at 16 weeks ($p < 0.001$). The increase in energy ratings was more pronounced in the second half of the study, possibly reflecting cumulative effects of supplementation (Table 4).

Sleep quality, also assessed via VAS, improved significantly from a baseline mean score of 5.4 (SD ± 1.3) to 6.9 (SD ± 1.1) at 8 weeks and 7.6 (SD ± 1.0) by the study's conclusion ($p < 0.001$). Participants reported both improved sleep duration and ease of falling asleep by the end of the intervention period (Table 5).

The timewise progression of WHO-5 and energy scores showed a parallel improvement, which is visually summarized in Chart 1. Similarly, GSRS scores showed a steady decrease alongside improving sleep quality scores, as depicted in Chart 2. No serious adverse effects were reported, and the supplement was well-tolerated overall.

These results suggest that daily intake of a combined probiotic and plant extract supplement may be associated with generalized improvements in subjective well-being, energy levels, digestive comfort, and sleep quality in otherwise healthy adults.

Table 1: Demographic Characteristics of Participants

Variable	Value
Mean Age (years)	39.2
Gender (Male)	52%
Gender (Female)	48%
Urban Residence	60%
Peri-Urban Residence	40%

Table 2: WHO-5 Well-Being Index Scores Over Time

Timepoint	Mean Score	SD
Baseline	58.4	12.3
8 Weeks	67.2	10.8
16 Weeks	72.5	9.4

Table 3: Gastrointestinal Symptom Rating Scale (GSRS) Scores Over Time

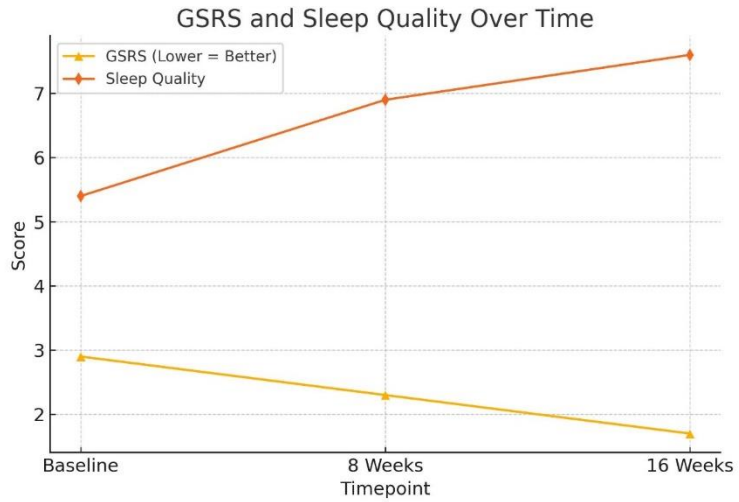
Timepoint	Mean Score	SD
Baseline	2.9	0.6
8 Weeks	2.3	0.5
16 Weeks	1.7	0.4

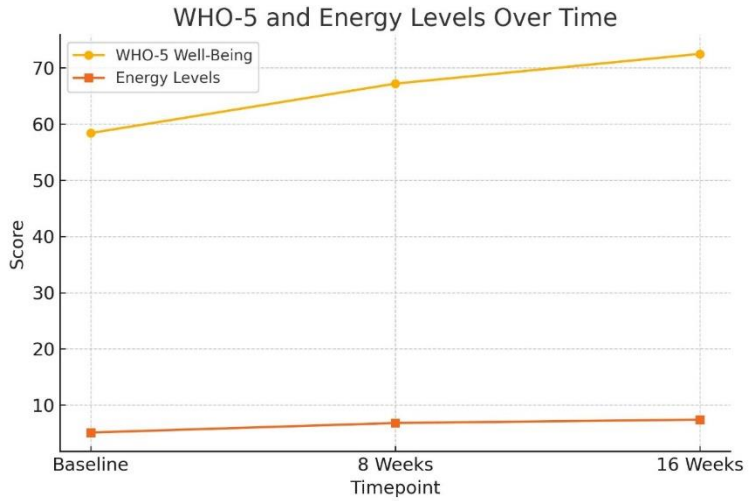
Table 4: Self-reported Energy Levels (VAS) Over Time

Timepoint	Mean Score (0-10)	SD
Baseline	5.1	1.2
8 Weeks	6.8	1.0
16 Weeks	7.4	0.9

Table 5: Sleep Quality (VAS) Over Time

Timepoint	Mean Score (0-10)	SD
Baseline	5.4	1.3
8 Weeks	6.9	1.1
16 Weeks	7.6	1.0





DISCUSSION

The findings of this descriptive study offer valuable preliminary insight into the potential associations between daily supplementation with combined probiotic blends and assorted plant extracts and improvements in general health markers among adults in a real-world setting (13). Over the 16-week observation period, consistent trends were observed across multiple nonspecific wellness domains, including psychological well-being, gastrointestinal comfort, energy levels, and sleep quality. These trends suggest that such combinations may yield cumulative benefits over time, even in individuals not experiencing any specific clinical conditions at baseline (14). The observed increase in WHO-5 Well-Being Index scores suggests a broad enhancement in subjective psychological wellness. This trend is noteworthy considering that participants were generally healthy and not presenting with clinical symptoms of mental distress. While improvements in mental well-being are often difficult to attribute to a single mechanism, the interplay between gut microbiota and the central nervous system—commonly described as the gut-brain axis—likely played a role. Probiotic strains, particularly those of Lactobacillus and Bifidobacterium, have previously demonstrated neuromodulatory potential through the production of neuroactive compounds and anti-inflammatory effects in the gut (15). The inclusion of plant extracts with adaptogenic and antioxidative properties may have further contributed to perceived mental clarity and resilience. Parallel improvements in gastrointestinal comfort, as evidenced by decreasing GSRS scores, support the idea that this multi-ingredient approach may help balance digestive function. Although the magnitude of change was moderate, the downward trajectory across all three data collection points indicates a potentially stabilizing effect on gut symptoms such as bloating, gas, and irregular bowel patterns. The addition of ginger and fennel, both known for their carminative and motility-enhancing properties, likely augmented the efficacy of the probiotic component in this regard. Notably, participants did not report significant adverse effects, and overall tolerability remained high throughout the study (16).

Energy levels and sleep quality, measured via visual analog scales, also demonstrated upward trends. These findings may be indirectly related to improved gastrointestinal health and overall gut ecosystem balance (17). Improved nutrient absorption and reduced gut inflammation are plausible contributing factors to enhanced energy, while the calming and neuroregulatory properties of certain plant compounds may have aided in sleep regulation. The alignment of improvements in sleep and energy with enhancements in well-being further supports a synergistic model of action for the supplement blend. A key strength of this study lies in its holistic design (18). By incorporating a blend of probiotics and botanicals rather than isolated components, the study more closely mimicked real-world supplement usage. Additionally, the focus on multiple domains of nonspecific health allowed for a broader understanding of general wellness trends, which often go unmeasured in more narrowly focused clinical trials. The use of validated assessment tools and a repeated-measures approach added further robustness to the findings (19). Despite its strengths, the study also presented several limitations. As a descriptive, non-controlled design, it lacked a placebo group, making it difficult to establish causality. The absence of blinding may have introduced response bias, particularly in self-reported outcome measures. While the use of standardized scales adds validity, subjective measures inherently carry variability that may be influenced by external or psychological factors.

Furthermore, the study's duration, although sufficient to observe emerging patterns, may not capture long-term sustainability or delayed effects. Another limitation lies in the lack of biochemical or microbiological endpoints, such as inflammatory markers or microbiota composition, which could have provided mechanistic insight into the observed changes (20).

The generalizability of these results is also constrained by the regional focus on South Punjab and the selection of participants who were generally healthy. Outcomes might differ in populations with clinical diagnoses, different dietary habits, or environmental exposures (21). Additionally, the proprietary nature of the supplement formulation means the results may not be reproducible with different combinations or dosages of ingredients. Future studies should build upon these findings by employing randomized controlled trial designs with larger and more diverse populations (22). Inclusion of objective biological measures would allow for a deeper understanding of mechanisms, while stratified analyses could identify specific subgroups more likely to benefit from such interventions. Exploration of dose-response relationships and long-term adherence would also be critical to guiding practical recommendations (23). In conclusion, the results of this study suggest that a daily supplement combining probiotic blends with plant extracts may be positively associated with improvements in psychological well-being, digestive comfort, energy levels, and sleep quality in healthy adults. While the findings are preliminary and descriptive in nature, they provide a promising foundation for further exploration into the integrative potential of multi-ingredient health supplements in promoting general wellness (24).

CONCLUSION

This study highlights the potential of combined probiotic and plant extract supplementation to positively influence nonspecific health outcomes in healthy adults, including improvements in well-being, digestive comfort, energy, and sleep quality. The findings underscore the practical relevance of multi-ingredient natural interventions in supporting general wellness and set the groundwork for more controlled research to validate and expand upon these effects in broader populations.

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