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Effects of total ginsenosides intervention on anxiety and cognitive function in cancer patients

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Abstract: Psychological distress and perceived cognitive difficulties are common among patients with cancer and can substantially affect quality of life, particularly in older populations receiving ongoing treatment. This pilot observational study examined changes in anxiety and perceived cognitive function following a short-term total ginsenosides intervention in cancer patients. Twenty patients with malignant disease (mean age 80.5 years) were included based on the availability of complete pre- and post-intervention data. Anxiety was assessed using the Hospital Anxiety and Depression Scale–Anxiety subscale (HADS-A), and subjective cognitive function was evaluated using the PROMIS Cognitive Function Short Form. Pre–post comparisons were conducted using non-parametric methods due to non-normal score distributions. Anxiety scores decreased markedly following the intervention, with mean HADS-A scores declining from 16.25 ± 2.38 to 8.50 ± 2.16 and a median reduction of 8 points (Wilcoxon signed-rank test, $p < 0.001$). Perceived cognitive function improved concurrently, with PROMIS-CF scores increasing from 11.75 ± 2.38 to 14.75 ± 2.38 and a median change of +3.0 points ($p < 0.001$). Exploratory correlation analysis demonstrated a moderate negative association between changes in anxiety and changes in perceived cognitive function (Spearman $\rho = -0.541$, $p = 0.0138$), suggesting that reductions in emotional distress were often accompanied by improvements in perceived cognitive clarity. The intervention was generally well-tolerated, with no serious adverse events reported. Due to the observational design and small sample size, causality cannot be inferred; however, these findings suggest that total ginsenosides may be associated with concurrent improvements in anxiety and subjective cognitive burden in the supportive care setting, warranting further investigation in controlled studies.

Keywords: anxiety; cancer; cognitive function; ginsenosides; psycho-oncology; supportive care

1. Introduction

Psychological distress and cognitive vulnerability remain prevalent concerns among individuals undergoing treatment for cancer, particularly those receiving chemotherapy or other systemic therapies [1–3]. Anxiety, uncertainty about disease progression, and treatment-related symptom burden can interfere with emotional regulation and coping ability [1,3,4], while cognitive changes such as impaired attention, reduced memory efficiency, and slowed processing may further disrupt daily functioning [5,6]. These psychosocial challenges not only diminish quality of life but may also influence treatment adherence, communication with healthcare professionals, and engagement with supportive care services [1,2].

Within this clinical context, there is growing interest in complementary interventions that may help stabilize emotional symptoms or cognitive performance

without imposing additional treatment burden. Total ginsenosides, derived from ginseng species and used in supportive care contexts, have been discussed in emerging literature for their potential neuroprotective and stress-modulating properties. Experimental findings suggest that ginsenosides may influence inflammatory pathways and neuronal signaling mechanisms associated with anxiety and cognitive regulation [7,8]. However, evidence in oncology settings remains preliminary, and clinical data regarding their psychosocial effects among cancer patients are still limited [8,9].

Despite the increasing use of supportive approaches in integrative oncology, few observational studies have examined pre-to-post intervention changes in both anxiety and cognitive function within the same patient cohort [3,10]. There is also a scarcity of studies capturing real-world clinical data in small samples that reflect routine treatment environments [4,10]. As a result, the practical relevance, safety profile, and psychosocial impact of total ginsenosides in cancer populations remain areas in need of further clarification [9].

Several epidemiological and clinical studies suggest that ginseng and its derivatives may be associated with beneficial outcomes in cancer populations. In a large cohort study of breast cancer survivors, regular ginseng use was associated with improved quality of life scores, particularly in psychological and social well-being domains, along with reduced overall and disease-specific mortality compared with non-users, highlighting a potential link between ginseng use and global health outcomes among cancer survivors [11]. Moreover, a randomized, double-blind, placebo-controlled trial of red ginseng (3,000 mg/day for three months) in patients with epithelial ovarian cancer receiving adjuvant chemotherapy demonstrated improvements in health-related quality of life measures, including emotional functioning, fatigue, and symptoms related to daily life, without significant differences in adverse events between placebo and ginseng groups [12]. These findings suggest that ginseng and its active components may influence psychological and functional aspects of patient experience during cancer treatment, providing a clinical basis for examining their effects on anxiety and perceived cognitive function in cancer patients.

The present pilot study aims to evaluate the effects of a short-term total ginsenosides intervention on anxiety and cognitive function in cancer patients. Using validated instruments for psychosocial assessment, the study compares pre-intervention and post-intervention scores to explore potential changes in psychological and cognitive outcomes [3,4]. While not intended to test causality or efficacy, this analysis provides preliminary observational data that may inform future controlled studies and contribute to ongoing discussions in psycho-oncology about supportive care strategies [2].

2. Methods

2.1. Study design

This study was conducted as a single-center, prospective observational pilot study designed to explore changes in anxiety and cognitive function among cancer patients receiving a short-term total ginsenosides intervention. The investigation adopted a pre–post within-subject design without randomization or a control group, reflecting real-world clinical practice. The primary objective was to describe psychosocial changes over time rather than to establish causality or therapeutic

efficacy.

2.2. Study setting

Data were collected in a routine oncology care setting where patients were receiving standard cancer treatment and follow-up. The ginsenosides intervention was introduced as a supportive measure and did not alter or replace ongoing oncological management, including chemotherapy or other systemic therapies. Clinical care decisions remained fully independent of study participation.

2.3. Participants

Approximately twenty adult patients diagnosed with cancer were included based on the availability of complete psychosocial assessment data before and after the intervention. Recorded demographic and clinical variables included sex (male/female), age, and current chemotherapy status (yes/no) at the time of intervention.

Participants were eligible for inclusion if they were able to complete self-reported questionnaires and had no documented history of severe neurological disease or cognitive impairment unrelated to cancer or its treatment. Patients with incomplete pre- or post-intervention psychosocial data were excluded from the analysis.

2.4. Intervention

Participants received total ginsenosides as a short-term supportive intervention. The product used was ShenYiJiaoNang (YaTai) (manufactured by Jilin Yatai Pharmaceutical Co., Ltd.). The intervention followed routine clinical practice rather than a research-specific protocol. The dosing regimen was 250 mg twice daily for 28 consecutive days. Of note, this intervention was not intended as an anticancer treatment and was not expected to affect tumor-related outcomes.

2.5. Outcome measures

2.5.1. Anxiety Assessment

Anxiety symptoms were assessed using the Hospital Anxiety and Depression Scale-Anxiety subscale (HADS-A). The HADS-A is a validated self-report instrument commonly used in oncology and psycho-oncology settings to assess anxiety symptoms while minimizing confounding from somatic illness. Participants completed the HADS-A immediately prior to initiating the ginsenosides intervention and again following the intervention period. Changes in anxiety scores were evaluated at the individual and group levels.

2.5.2. Cognitive function assessment

Subjective cognitive function was assessed using one of the following validated instruments, depending on availability in patient records:

- the Patient-Reported Outcomes Measurement Information System (PROMIS) Cognitive Function Short Form (4 items), or
- the Functional Assessment of Cancer Therapy-Cognitive Function (FACT-Cog) Perceived Cognitive Impairments (PCI) short version.

Among all 20 participants included in this study, the PROMIS Cognitive Function Short Form (4 items) was used to complete the assessment. For each participant, the same cognitive assessment tool was used at both time points to ensure intra-individual comparability.

2.5.3. Safety and adverse effects

Safety was evaluated descriptively based on patient-reported and clinically observed adverse effects during the intervention period. Adverse events were recorded

as a binary variable (yes/no). No attempt was made to formally attribute causality, given the observational nature of the study and the concurrent use of other medical treatments.

2.6. Data management

All patient data were anonymized prior to analysis. Variables included demographic characteristics, chemotherapy status, pre-intervention and post-intervention HADS-A scores, pre-intervention and post-intervention cognitive function scores, and adverse effect status. Data integrity was checked for completeness and consistency before statistical analysis.

2.7. Statistical analysis

Descriptive statistics were used to summarize demographic and clinical characteristics. Continuous variables were presented as means with standard deviations or medians with interquartile ranges, depending on distribution. Categorical variables were summarized using frequencies and percentages.

Primary analyses focused on within-subject pre–post comparisons:

- Changes in anxiety scores (HADS-A) were analyzed using paired-samples t-tests or Wilcoxon signed-rank tests, depending on distributional assumptions.
- Changes in cognitive function scores were analyzed using the same paired approach, applied separately for each cognitive instrument.

Exploratory subgroup analyses were conducted to examine whether psychosocial changes differed according to chemotherapy status (yes/no), using non-parametric between-group comparisons of change scores where sample size permitted. These analyses were explicitly treated as hypothesis-generating.

Correlation analyses were optionally performed to explore associations between changes in anxiety and changes in cognitive function using Spearman rank correlation coefficients. Given the small sample size, these results were interpreted descriptively.

All statistical analyses were exploratory in nature. Statistical significance was interpreted cautiously, and emphasis was placed on the direction and clinical relevance of observed changes rather than formal hypothesis testing. Analyses were performed using standard statistical software.

2.8. Ethical considerations

This study analyzed anonymized clinical data provided by the client and did not involve experimental manipulation or deviation from standard clinical care. The ginsenosides intervention was offered as supportive care. Ethical approval, waiver information, or patient consent procedures will be reported in accordance with documentation provided by the client and institutional requirements.

3. Results

3.1. Participant characteristics

A total of 20 patients with malignant disease were included in the final analysis based on the availability of complete pre-intervention and post-intervention psychosocial data. The study population was characterized by advanced age, with a mean age of 80.5 years (SD 7.0; range 72–99 years), reflecting an elderly oncology cohort receiving routine clinical care. The sample comprised 15 male patients (75%) and 5 female patients (25%).

With respect to oncological diagnosis, all participants had a confirmed malignant

tumor diagnosis. The most frequently observed primary cancer types were lung cancer ($n = 7$), prostate cancer ($n = 3$), and colorectal cancer ($n = 3$). Less common diagnoses included pancreatic cancer, breast cancer, laryngeal cancer, and salivary gland malignancy, each represented by a small number of cases. Several patients also presented with metastatic disease or multiple comorbid conditions, consistent with the advanced age and clinical complexity of the cohort.

At the time of the intervention, a proportion of patients were actively undergoing chemotherapy, while others were in non-chemotherapy phases of care. Baseline demographic and clinical characteristics of the participants are summarized in **Table 1**.

Table 1. Baseline demographic and clinical characteristics of the study participants ($N = 20$).

Characteristic	Value
Age, years	Mean $\pm$ SD: 80.5 ± 7.0
	Range: 72–99
Sex, n (%)	Male: 15 (75%)
	Female: 5 (25%)
Primary cancer diagnosis, n	Lung cancer: 7
	Prostate cancer: 3
	Colorectal cancer: 3
	Pancreatic cancer: 1
	Breast cancer: 1
	Laryngeal cancer: 1
	Salivary gland cancer: 1
	Other malignant tumors: 3

3.2. Changes in anxiety symptoms

Anxiety symptoms were assessed using the Hospital Anxiety and Depression Scale-Anxiety subscale (HADS-A) before and after the total ginsenosides intervention. All 20 participants had complete paired anxiety data and were included in the analysis.

Table 2 shows the pre-post changes in anxiety (HADS-A score), with mean HADS-A scores decreased from 16.25 ± 2.38 prior to the intervention to 8.50 ± 2.16 following the intervention. The median change in anxiety score was -8.0 points, indicating a marked reduction in self-reported anxiety symptoms across the study cohort.

Assessment of the distribution of difference scores indicated significant deviation from normality (Shapiro–Wilk test, $p < 0.001$). Accordingly, non-parametric analysis was prioritized. The Wilcoxon signed-rank test demonstrated a statistically significant reduction in anxiety scores following the intervention ($W = 0$, $p < 0.001$).

These findings indicate a consistent downward shift in anxiety symptoms after the intervention, although individual variability in response was observed.

Table 2. Pre–post changes in anxiety (HADS-A scores).

Measure	Mean ± SD
Pre-intervention HADS-A	16.25 ± 2.38
Post-intervention HADS-A	8.50 ± 2.16
Median change (Post – Pre)	–8.0
Wilcoxon signed-rank test	$p < 0.001$

3.3. Changes in cognitive function

Subjective cognitive function was assessed using the PROMIS Cognitive Function Short Form. Complete paired pre-intervention and post-intervention PROMIS-CF data were available for all 20 participants included in the analysis.

Table 3 displays the pre-post changes in cognitive function (PROMIS-CF score), where mean PROMIS-CF scores increased from 11.75 ± 2.38 at baseline to 14.75 ± 2.38 following the intervention. The median change in PROMIS-CF score was +3.0 points, indicating an overall improvement in perceived cognitive functioning after the intervention period.

Assessment of difference scores demonstrated significant deviation from normality (Shapiro–Wilk test, $p < 0.001$). Accordingly, non-parametric analysis was prioritized. The Wilcoxon signed-rank test showed a statistically significant increase in PROMIS-CF scores following the intervention ($W = 0$, $p < 0.001$).

Although the magnitude of improvement varied across individuals, the overall pattern suggests a consistent enhancement in self-reported cognitive clarity and reduced perceived cognitive difficulties among participants.

Table 3. Pre–post changes in cognitive function (PROMIS-CF scores).

Measure	Mean ± SD
Pre-intervention PROMIS-CF	11.75 ± 2.38
Post-intervention PROMIS-CF	14.75 ± 2.38
Median change (Post – Pre)	+3.0
Wilcoxon signed-rank test	$p < 0.001$

3.4. Safety and adverse effects

Safety outcomes were assessed descriptively based on patient-reported adverse effects during the intervention period. Of the 20 participants included in the analysis, 16 patients (80%) reported no adverse effects, while 4 patients (20%) reported experiencing adverse effects.

All reported adverse effects were mild and did not result in discontinuation of the intervention. No serious adverse events were observed. Given the observational design and concurrent oncological treatments, no causal relationship between the intervention and reported adverse effects was inferred.

3.5. Association between changes in anxiety and cognitive function

Exploratory correlation analysis was conducted to examine the relationship between changes in anxiety symptoms and changes in perceived cognitive function.

Change scores were calculated for HADS-A and PROMIS-CF measures by subtracting pre-intervention scores from post-intervention scores.

Spearman rank correlation analysis demonstrated a moderate negative association between changes in anxiety and changes in perceived cognitive function ($\rho = -0.541$, $p = 0.0138$). Participants who experienced greater reductions in anxiety tended to report greater improvements in perceived cognitive clarity.

These findings suggest a coordinated psychosocial response in which emotional distress and subjective cognitive burden improved concurrently following the intervention. Given the exploratory nature of the analysis and the small sample size, results should be interpreted cautiously.

4. Discussion

This prospective observational pilot study examined changes in anxiety and subjective cognitive function in cancer patients following a short-term total ginsenosides intervention. Using validated psychosocial assessment tools, the study results showed a significant reduction in anxiety symptoms, along with improvements in self-reported cognitive function. Furthermore, a moderate negative correlation was observed between changes in anxiety and perceived cognitive function, suggesting that improvements in emotional distress and cognitive burden tend to occur concurrently.

Anxiety levels, as measured by the HADS-A, showed a marked decrease following the intervention, with a median reduction that is clinically meaningful in psycho-oncology settings. Elevated anxiety is widely recognized as a common and distressing feature among patients with cancer, particularly in older populations and those receiving systemic treatment [13,14]. High anxiety can amplify symptom perception, impair concentration, and contribute to cognitive complaints [15–17]. The observed reduction in anxiety therefore represents an important psychosocial outcome, even in the absence of causal inference.

Improvements were also observed in perceived cognitive function, as assessed by PROMIS-CF. The increase in PROMIS-CF scores indicates a reduction in subjective cognitive difficulties, such as problems with attention, clarity, or mental efficiency in daily life. Importantly, the measure captures patient's lived cognitive experience rather than objective neuropsychological performance. From a psycho-oncology perspective, this distinction is essential, as perceived cognitive burden often has a stronger impact on quality of life, confidence, and social participation than formal cognitive test results [18–20].

A key finding of this study is the significant negative correlation between changes in anxiety and changes in perceived cognitive function. Participants who experienced greater reductions in anxiety tended to report greater improvements in cognitive clarity. This pattern aligns with established psycho-oncology models in which emotional distress and cognitive complaints are interrelated rather than independent phenomena. Anxiety can consume attentional resources, heighten vigilance, and exacerbate subjective cognitive difficulties, while relief from emotional distress may allow patients to perceive improved mental functioning. The present findings support this psychosocial linkage and suggest that interventions targeting emotional well-being may have secondary benefits for cognitive experience.

The safety analysis further supports the feasibility of the intervention within routine clinical care. Most participants did not report adverse effects, and those who did experienced only mild symptoms that did not require discontinuation. No

serious adverse events were observed. While safety conclusions cannot be definitive in an observational study without a control group, these findings suggest acceptable tolerability when the intervention is used as supportive care alongside standard oncology treatment.

Several limitations should be acknowledged. First, the study employed a small sample size and a single-center observational design, which limits generalizability and precludes causal inference. Second, the absence of a control group means that improvements cannot be definitively attributed to the intervention, and placebo effects, regression to the mean, or concurrent psychosocial influences cannot be excluded. Third, cognitive outcomes were assessed using self-report measures, which reflect subjective experience rather than objective neurocognitive performance. Finally, the advanced age of the cohort may influence both baseline symptom burden and responsiveness to supportive interventions.

Despite these limitations, the study has several strengths. It focuses on psychosocial outcomes that are highly relevant to cancer patients yet often underrepresented in clinical research. The use of validated instruments, paired analyses, and non-parametric statistical methods strengthens the credibility of the findings. Moreover, the integration of anxiety and cognitive outcomes provides a more holistic view of patient experience, consistent with psycho-oncology principles.

In conclusion, this pilot study suggests that total ginsenosides intervention is associated with reduced anxiety and improved perceived cognitive function in cancer patients, with acceptable short-term tolerability. The observed association between emotional and cognitive improvements highlights the interconnected nature of psychosocial symptoms in oncology. These findings support further investigation in larger, controlled studies and underscore the importance of addressing emotional distress as part of comprehensive cancer care.

5. Conclusion

This observational pilot study examined changes in anxiety and subjective cognitive function in cancer patients receiving a short-term total ginsenosides intervention. The results showed a significant reduction in anxiety symptoms accompanied by improvements in self-reported cognitive function, and a moderate negative correlation was observed between changes in emotional distress and perceived cognitive burden. These findings suggest that, in the supportive care context, improvements in anxiety and cognitive experience may occur synchronously.

The intervention was generally well-tolerated, with no serious adverse events reported, indicating its feasibility as a complementary approach to conventional oncological treatment. Although the observational design and small sample size preclude causal inference, this study demonstrates the potential value of addressing emotional distress as part of integrated psycho-oncological support.

Further research using larger, controlled designs is warranted to clarify the mechanisms underlying these psychosocial changes and to determine the role of total ginsenosides within integrated supportive care strategies for cancer patients.

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Conflict of interest: The authors declare no conflict of interest.

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