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IMPACT OF DIETARY SUPPLEMENT RECOMMENDATIONS ON HEMATOLOGICAL AND BIOCHEMICAL PARAMETERS IN CANCER PATIENTS FROM KOSOVO: A SIX-MONTH CLINICAL EVALUATION

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ABSTRACT

Cancer remains one of the leading causes of mortality worldwide, and its management requires a comprehensive approach, including nutritional support. Dietary supplements are increasingly considered as adjunctive therapies to improve clinical outcomes, particularly in addressing anemia, iron imbalance, and systemic decline. However, evidence regarding their hematological impact remains limited and inconsistent.This study aimed to evaluate whether the introduction of dietary supplement recommendations leads to statistically significant changes in selected hematological and biochemical blood parameters in cancer patients from Kosovo over a six-month period. A total of 50 cancer patients were included, with 25 receiving specific dietary supplement recommendations. Blood parameters were measured before and six months after implementation. Key variables included hemoglobin, erythrocyte, leukocyte, platelet counts, iron levels, sedimentation rate, liver enzymes aspartate aminotransferase (AST) and alanine aminotransferase (ALT), urea, and creatinine. Statistical analysis utilized descriptive statistics and the Wilcoxon Signed Rank test due to non-normal data distribution.Statistically significant increases were observed in hemoglobin, erythrocytes, platelets, iron, sedimentation rate, urea, and creatinine. ALT showed a significant decrease, while leukocytes and AST did not show significant changes.The implementation of dietary supplement recommendations in cancer patients resulted in statistically significant changes in 8 out of 10 analyzed blood parameters, suggesting a potential positive role in supporting hematological and biochemical status during cancer treatment. These findings support the need for further controlled trials to determine the clinical significance and optimize supplementation strategies in oncology care.

1. Introduction

Cancer remains one of the leading global health burdens, responsible for a substantial proportion of deaths each year and presenting significant challenges for healthcare systems worldwide. The complexity of cancer treatment extends far beyond conventional oncological therapies such as surgery, chemotherapy, and radiation; it also encompasses comprehensive supportive care aimed at maintaining or improving patients' overall well-being and treatment outcomes. One critical aspect of this supportive care is nutritional management, given that many cancer patients suffer from malnutrition, weight loss, anemia, and metabolic imbalances such as hypo- or hyperferremia. These disturbances can severely impair the body's ability to tolerate and respond effectively to therapy, reduce physical functioning, and diminish quality of life (Argilés et al., 2019). In this light, nutritional support, including the use of dietary supplements, is gaining increasing recognition as a valuable adjunct to conventional cancer therapy. Supplements such as vitamins, minerals, amino acids, and trace elements may help correct nutritional deficiencies, improve biochemical and hematological parameters (e.g., hemoglobin and iron levels), and bolster the immune system, which is often compromised in cancer patients (Niederer et al., 2018). These interventions may also contribute to better resilience during intensive treatments, potentially reducing complications and hospitalization time. Furthermore, emerging research suggests that integrating individualized nutritional strategies into oncology care may improve treatment adherence and long-term survival, particularly in patients at high risk of malnutrition or cancer-related cachexia (Siegel et al., 2020). However, while the role of dietary supplements is promising, it must be carefully managed to avoid adverse interactions with oncological therapies and ensure that supplementation is both evidence-based and tailored to the patient’s clinical profile.

Despite the growing interest in the use of dietary supplements in oncology, scientific evidence regarding their efficacy and safety remains both limited and contradictory. While a number of studies indicate that specific supplements can have a beneficial effect—particularly in improving hematological parameters such as hemoglobin and serum iron levels—these findings are not consistent across all research. For instance, Faber et al. (2017) demonstrated that targeted nutritional interventions may play a significant role in managing anemia in cancer patients by enhancing the absorption and utilization of iron, potentially reducing the need for pharmacological treatments such as erythropoietin-stimulating agents or blood transfusions. However, contrasting evidence highlights the potential risks associated with supplement use during cancer treatment. According to Ladas et al. (2015), some dietary supplements—especially those containing antioxidants, herbal extracts, or high doses of vitamins—may interfere with the mechanisms of action of chemotherapeutic drugs. This interference could lead to reduced treatment efficacy, altered drug metabolism, or even increased toxicity. Furthermore, the regulation of dietary supplements is often less stringent than that of pharmaceutical drugs, raising concerns about product quality, consistency, and contamination. Given these conflicting findings, it is evident that further high-quality, large-scale randomized controlled trials are essential to determine the safety, efficacy, and appropriate clinical use of dietary supplements in oncology. Until then, healthcare professionals must take a cautious and individualized approach when advising cancer patients about supplement use, carefully considering the type of supplement, the patient’s specific clinical status, and ongoing treatments.

Furthermore, changes in blood parameters such as erythrocyte, leukocyte, and platelet counts, as well as levels of liver enzymes like AST and ALT, serve as critical clinical indicators for monitoring the physiological status of cancer patients throughout treatment. These hematological and biochemical markers not only reflect the patient’s general health and immune function but also provide insight into the effects of interventions such as nutritional supplementation. For example, improvements in hemoglobin or erythrocyte counts may suggest a positive impact on anemia management, while stable or improved liver enzyme levels could indicate that dietary interventions are not causing hepatotoxic effects (Blum et al., 2016). Monitoring such parameters is particularly relevant in oncology, where patients are often exposed to aggressive treatments that can compromise bone marrow function and liver metabolism. Consequently, any potential therapeutic or supportive approach—including dietary supplementation—must be evaluated not only for efficacy but also for safety, making these blood markers essential tools for assessment. From a methodological standpoint, statistical tests are crucial for determining whether observed changes in these parameters are meaningful. Since clinical data often deviate

from normal distribution due to biological variability and the heterogeneity of patient populations, non-parametric tests such as the Wilcoxon Signed Rank test are preferred. This test is particularly suitable for analyzing paired data before and after an intervention, allowing researchers to detect statistically significant shifts in median values even in the presence of outliers or skewed distributions (Conover, 1999). The use of such robust statistical tools ensures that conclusions drawn from clinical studies are both valid and reliable, especially when working with small or non-normally distributed samples, as is common in medical research.

The aim of this study is to investigate whether the introduction of recommendations for the use of dietary supplements leads to statistically significant changes in key blood parameters in cancer patients, with the goal of providing a scientific basis for their potential implementation as part of a comprehensive treatment.

2. Literature review

2.1. Experiences with dietary supplement use in cancer patients

There are specific clinical scenarios in which dietary supplements are prescribed during cancer treatment, such as vitamin B12 and folic acid for patients undergoing certain chemotherapies (Yasueda et al., 2016). Despite the lack of strong evidence that supplements can prevent or treat cancer, many patients still use them, and data on their prevalence is limited (Marian, 2017). The impact of supplements, particularly antioxidants, on the effectiveness and toxicity of chemotherapy and radiotherapy remains unclear (Yasueda et al., 2016). While antioxidants may reduce side effects by protecting normal cells, they may also protect tumor cells, reducing the effectiveness of treatment (Yasueda et al., 2016). Some studies have shown benefits, such as vitamin E improving chemotherapy-induced neutropenia, but others found potential risks with high folate levels (Branda et al., 2004). A Turkish study found that 96% of cancer patients used non-pharmacological complementary methods like prayer, while only 4% used vitamins or supplements, with use influenced by education and employment status (Yalcin et al., 2018). The U.S. Preventive Services Task Force concluded that vitamin D might reduce cancer risk in randomized trials, but observational studies suggest the opposite (Wang et al., 2014). Another study found no clear link between vitamin D levels and chemotherapy-induced toxicity, casting doubt on its effectiveness in cancer care (Kitchen et al., 2012). Cancer survivors are more likely to use supplements than the general population, particularly those with breast, prostate, colorectal, or lung cancer, citing quality of life and treatment symptom management as reasons (Marian, 2017). One Korean study found that survivors consumed more vitamins and minerals like folate, riboflavin, and calcium, especially among women with higher education and physical activity levels (Song et al., 2017).

2.2. Hematological and biochemical analysis of blood samples in breast cancer patients

Several hematological and biochemical parameters, including hemoglobin, white blood cell counts, blood sugar, liver enzymes, bilirubin, alkaline phosphatase (ALP), proteins, creatinine, and electrolytes, were analyzed in breast cancer patients (Shreya et al., 2023). Blood sugar levels were significantly elevated in late-stage breast cancer patients, with 85% of those having high random blood sugar (RBS) being in advanced stages, linking high RBS to aggressive tumors (Shreya et al., 2023). Elevated glucose promotes cancer cell proliferation and migration, worsening the disease prognosis (Shander et al., 2004). ALP, a marker for liver function and metastasis, was increased in 41% of early-stage and 59% of late-stage patients, indicating its potential as a diagnostic marker for metastases (Shreya et al., 2023). Anemia was found in 30 patients, mostly in late stages, suggesting disease progression impairs blood cell production (Shreya et al., 2023). Metastases in breast cancer are known to suppress hematopoiesis, contributing to anemia (Shander et al., 2004). Elevated urea levels, an indicator of kidney function, were observed in 70% of advanced and 30% of early-stage patients, correlating with cancer progression (Shreya et al., 2023). Increased total serum protein also correlated with advanced disease, further supporting the relationship between biochemical markers and cancer stages (Shreya et al., 2023). These findings highlight the importance of routine blood tests for monitoring disease progression and potential metastasis in breast cancer patients (Shreya et al., 2023). Overall, hematological and biochemical parameters can serve as valuable indicators in the clinical management of breast cancer.

3.Materials and Methods

In order to determine whether the use of dietary supplements in cancer patients leads to an improvement in their health status, as reflected through the quality of their blood parameters, measurements were conducted on a total of 50 patients from Kosovo within the sample before and after providing recommendations for supplement use. Specifically, half of the patients included in the study were given recommendations regarding the use of dietary supplements (Table 1), and blood tests were performed at the beginning and six months after the recommendations were given. The same blood parameters observed in the previous part of the analysis were monitored here, with the aim of determining whether the change in habits leads to an improvement in the blood parameters of these patients, i.e., whether there are statistically significant differences in the values of these parameters before and after the given recommendations.

From a statistical point of view, the analysis was based on descriptive statistics to obtain a general overview of the condition, as well as on conducting the Wilcoxon Signed Rank test, which is a non-parametric test used to determine differences in medians in paired samples. According to theoretical and empirical literature, the Wilcoxon Signed Rank test is the most appropriate choice when comparing mean values before and after a certain treatment. As before, the analysis involved the use of non-parametric tests because the distribution of the variables, i.e., the measured values of the blood parameters, does not follow a normal distribution.

The analysis for each parameter separately is presented in tables as an overview of the descriptive statistics from the measurements before and after the recommendations, as well as graphically, by displaying two comparative boxplot charts for measurements taken before and after the recommendations. Additionally, to complement and conclude the analysis, information is provided about the calculated test statistic and its corresponding p-value, based on which it is possible to determine whether the identified changes in the mean values of the measured parameters through descriptive statistics are statistically significant or not.

4. Results and discussion

To determine whether the use of dietary supplements in cancer patients leads to an improvement in their health status, as reflected by the quality of their blood parameters, measurements were taken from a total of 50 patients before and after receiving recommendations for supplement use (Table 1). Specifically, half of the patients in the study were given recommendations regarding the use of dietary supplements, and their blood parameters were measured at the start and six months after the recommendations. The same blood parameters were observed as in the previous analysis (Dina K. et al., 2025), with the goal of assessing whether the change in habits leads to an improvement in blood parameters among these patients, and whether there are statistically significant differences in these values before and after the recommendations.

Table 1. Daily nutrition menu for oncology patients with supplements.

Meal	Food	Supplements
Breakfast	Oatmeal with fortified almond milk or low-fat milk Fresh berries (blueberries, strawberries) 1 boiled egg or low-fat Greek yogurt	**Multivitamin with minerals (B12, folate, vitamin D)**
Mid-Morning Snack	Smoothie (banana, spinach, protein powder) Handful of nuts (almonds or walnuts)	**Omega-3 fatty acids (fish oil)**

Meal	Food	Supplements
Lunch	Grilled salmon or chicken breast Quinoa or brown rice Steamed broccoli and carrots Mixed green salad with olive oil and lemon dressing	**Vitamin D (if deficient or prescribed)**
Afternoon Snack	Apple slices with almond butter Herbal tea or water with lemon	**Probiotic supplement**
Dinner	Lentil or chickpea stew Roasted sweet potatoes Steamed green beans Whole-grain bread (small portion)	**Iron supplement (if anemia present and prescribed)**
Evening Snack	Low-fat cottage cheese or small serving of fruit Hydration with water or electrolyte beverage	

From a statistical perspective, the analysis involved descriptive statistics to gain a general overview of the data, as well as the Wilcoxon Signed Rank test, a non-parametric test used to identify differences in medians in paired samples. According to theoretical and empirical literature, the Wilcoxon Signed Rank test is the most appropriate choice when comparing average values before and after a treatment. Non-parametric tests were used because the distribution of the variables (blood parameter values) did not follow a normal distribution.The analysis of each parameter is presented in tables showing descriptive statistics before and after the recommendations, accompanied by boxplot graphs comparing the two sets of measurements. Additionally, the calculated test statistics and corresponding p-values are provided to determine whether the observed changes in average values are statistically significant.

4.1. Hemoglobin

The results show a significant increase in hemoglobin values among cancer patients. Initially, hemoglobin levels ranged from 8.3 g/dl to 15.5 g/dl, with a median value of 13.4 g/dl. Six months after the recommendations, values ranged from 10.6 g/dl to 16.5 g/dl, with a median of 14.65 g/dl (Table 2). The accompanying boxplot clearly illustrates this rightward shift, indicating an increase in hemoglobin values while maintaining a similar distribution shape (Fig. 1). The Wilcoxon Signed Rank test statistic was 5.43, with a p-value of 0.00, confirming that the difference is statistically significant at the 0.05 level. Thus, dietary habit changes led to an average increase of approximately 1 g/dl in hemoglobin over six months.

Table 2. Descriptive statistic of hemoglobin.

Indicator	Before	After
Average	13.2	14.2
Median	13.4	14.65
Maximum	15.5	16.5
Minimum	8.3	10.6
Std. Deviation	1.86	1.55

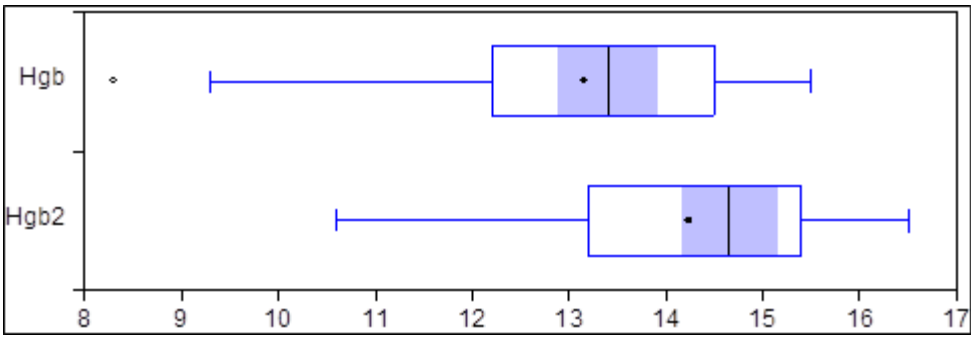

Fig. 1. Hemoglobin: Boxplot – comparison of measurements before (Hgb) and after the given recommendations (Hbg2).

4.2. Erythrocytes

A slight increase was also observed in erythrocyte counts. Initial measurements ranged from 3.0 to 5.12 x10^6/mm^3, with a median of 4.48 x10^6/mm^3. Six months post-recommendations, values ranged from 3.6 to 5.7 x10^6/mm^3, with a median of 4.7 x10^6/mm^3 (Table 3). The Wilcoxon test statistic was 3.17, with a p-value of 0.00, indicating a statistically significant increase.

Table 3. Descriptive statistic of erythrocytes.

Indicator	Before	After
Average	4.3	4.5
Median	4.48	4.7
Maximum	5.12	5.7
Minimum	3.0	3.6
Std. Deviation	0.52	0.53

The box plot shows an increase in both the median and mean erythrocyte values after the intervention (Eritrocitet2), indicating overall improvement (Fig. 2). The minimum value also increased, suggesting better outcomes among the lowest cases. Additionally, the distribution shifted upward with similar variability, reflecting a general positive change.

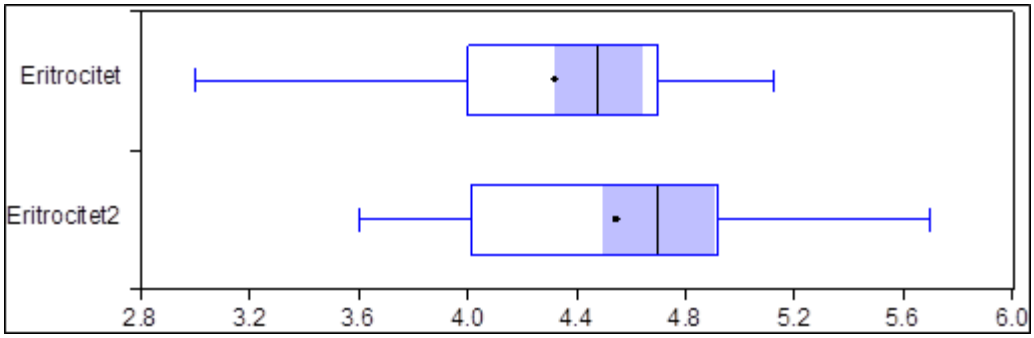

Fig. 2. Erythrocytes: Boxplot – comparison of measurements before (Eritrocitet) and after the given recommendations (Eritrocitet2).

4.3. Platelets

Platelet counts also increased, with median values rising from 202 x10^6/mm³ to 235 x10^6/mm³ (Table 4). Despite a similar range of values, the Wilcoxon test result (3.22) and p-value (0.00) indicate significant differences before and after the dietary changes.

Table 4. Descriptive statistic of platelets.

Indicator	Before	After
Average	224.9	242.9
Median	202	235
Maximum	401	402
Minimum	103	18
Std. Deviation	67.48	70.08

The box plot show an increase in both the median and mean platelets values after the intervention, suggesting an overall improvement (Fig. 3). Although the maximum values are similar, the minimum value in the “After” group is much lower, with one clear outlier below 40. Despite this, the central distribution of data has shifted upward, indicating better platelet counts in most cases.

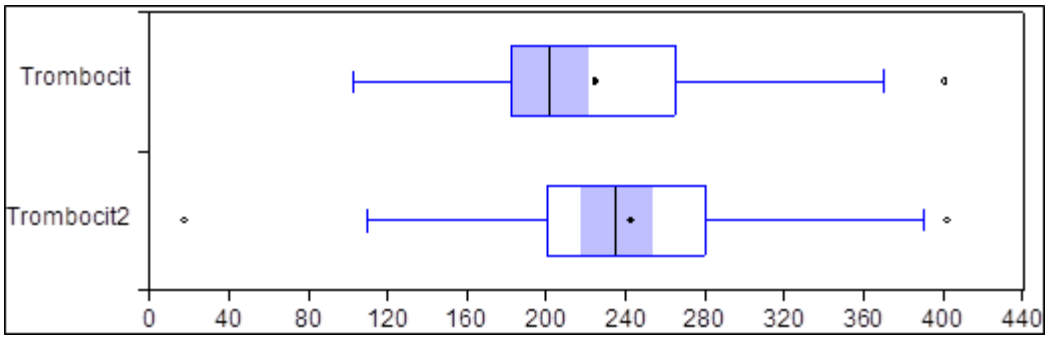

Fig. 3. Plates: Boxplot – comparison of measurements before (Trombocit) and after the given recommendations (Trombocitt2).

4.4. Leukocytes

Although there was a visible increase in leukocyte counts, the change was not statistically significant. Initial values ranged from 5.15 to 14.3 x10^6/mm^3, with a median of 7.7 x10^6/mm^3, while after six months, values ranged from 5.0 to 13.2 x10^6/mm^3, with a median of 8.35 x10^6/mm^3 (Table 5). The Wilcoxon test statistic was 1.57 with a p-value of 0.12, indicating no statistical significance, likely due to high variability in the data.

Table 5. Descriptive statistic of leukocytes.

Indicator	Before	After
Average	7.9	8.4
Median	7.7	8.35
Maximum	14.3	13.2
Minimum	5.15	5.0
Standard Deviation	1.82	1.71

The box plot shows a slight increase in both the median and mean leukocyte values after the intervention (Fig. 4). The spread of the data is similar, but the after group has slightly higher central values and fewer extreme outliers. Overall, this suggests a modest upward shift in leukocyte levels in most individuals.

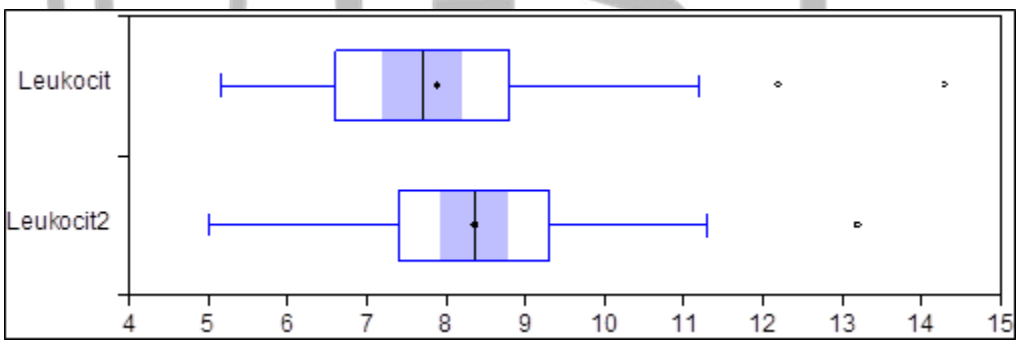

Fig. 4. Leukocytes: Boxplot – comparison of measurements before (Leukocit) and after the given recommendations (Leukocit2).

4.5. Iron

Changes in dietary habits resulted in increased iron levels, with initial measurements ranging from 50 to 150.2 mcg/dl and a median of approximately 80 mcg/dl. After six months, levels ranged from 70.5 to 190.3 mcg/dl, with a median of 100 mcg/dl (Table 6). The Wilcoxon test statistic was 5.96, p-value 0.00, confirming significant increases in iron levels.

Table 6. Descriptive statistic of iron.

Indicator	Before	After
Average	89.0	109.4
Median	80.15	100
Maximum	150.2	190.3
Minimum	50.5	70.5
Standard Deviation	27.28	30.11

The box plot (Fig. 5) illustrates a notable increase in both the median and mean iron levels after the intervention, suggesting an overall improvement in iron status. The entire distribution has shifted to the right, indicating that most individuals had higher iron levels post-intervention. Additionally, the minimum value increased, which means even the lowest readings improved. There are still a few high outliers present in both groups, but the central tendency and spread show a consistent upward trend. This pattern reflects a positive response in iron levels following whatever intervention or treatment was applied.

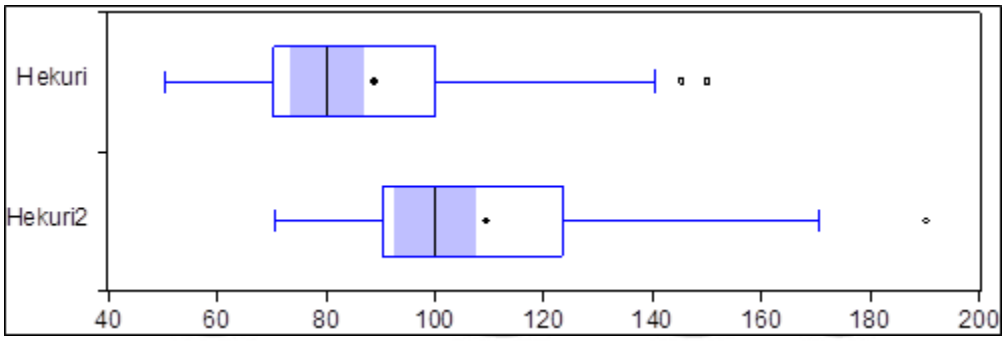

Fig. 5. Iron: Boxplot – comparison of measurements before (Hekuri) and after the given recommendations (Hekuri2).

4.6. Sedimentation Rate

A significant increase was observed in sedimentation rate values, with the median rising from 8 mm/h to 13.1 mm/h, exceeding the upper reference limit of 10 mm/h. The range expanded from a maximum of 40 mm/h to 60 mm/h after six months (Table 7). The Wilcoxon test statistic of 3.13 (p = 0.00) confirmed statistical significance.

Table 7. Descriptive statistic of sedimentation rate.

Indicator	Before	After
Average	11.9	14.9
Median	8.0	13.1
Maximum	40.0	60.0
Minimum	5.0	5.0

Indicator	Before	After
Standard Deviation	9.34	10.20

The box plot compares sedimentation rates before and after an intervention (Fig. 6). After the intervention, both the median and mean values increased, indicating a general rise in sedimentation levels. The interquartile range (middle 50% of the data) has shifted slightly higher, and more extreme outliers appear in the post-intervention group, including values above 60. Despite this increase in central tendency, the overall spread of the data remains similar, with whiskers extending to comparable ranges. These changes suggest that while most individuals experienced a moderate increase, a few cases had a significant spike in sedimentation**,** affecting the distribution.

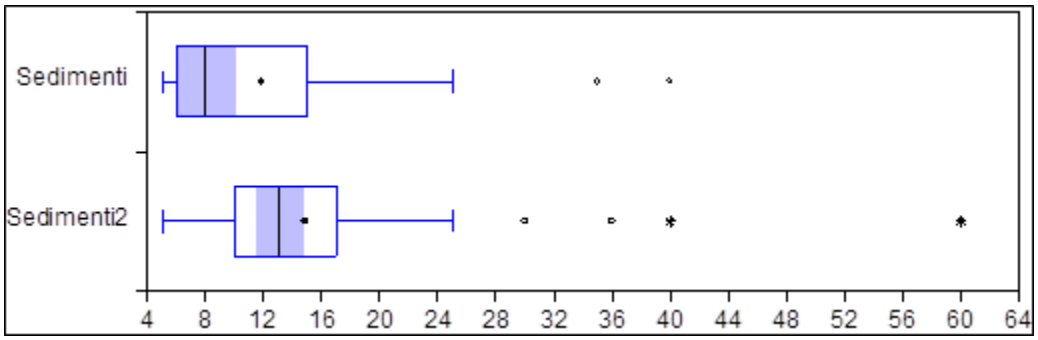

Fig. 6. Sedimentation Rate: Boxplot – comparison of measurements before (Sedimenti) and after the given recommendations (Sedimenti2).

4.7. Liver Enzymes (AST and ALT)

No significant changes were observed in AST levels, with median values remaining at 22.2 U/L both before and after (Table 8). The Wilcoxon test yielded a statistic of 0.18 and a p-value of 0.85.

Table 8. Descriptive statistic of AST.

Indicator	Before	After
Average	26.1	25.8
Median	22.2	22.2
Maximum	50.5	48.2
Minimum	15.5	17.5
Standard Deviation	9.48	8.02

The box plot shows that AST levels remained relatively stable before and after the intervention (AST vs. AST2), with only minor changes in the median and mean (Fig. 7). The spread of the data is similar, though the AST2 group has slightly fewer extreme outliers. Overall, the results suggest no significant change in AST levels post-intervention.

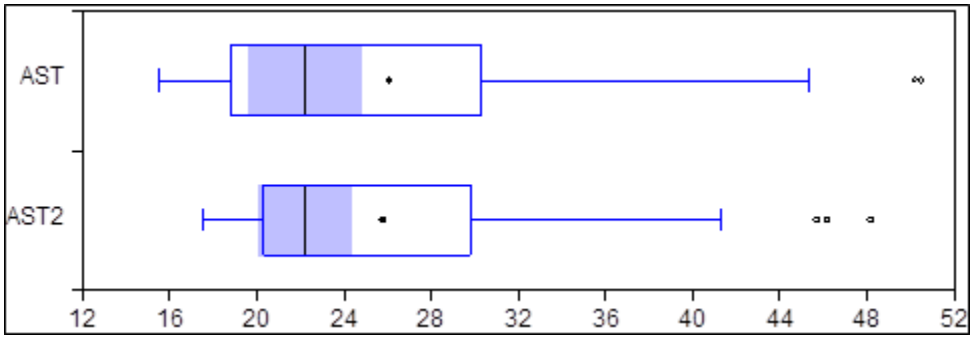

Fig. 7. AST: Boxplot – comparison of measurements before (AST) and after the given recommendations (AST2).

However, ALT levels showed a statistically significant decrease, with median values dropping from 25.25 U/L to 23.85 U/L (Table 9). Wilcoxon test statistic 0.25, p = 0.01.

Table 9. Descriptive statistic of ALT.

Indicator	Before	After
Average	28.7	27.4
Median	25.25	23.85
Maximum	55.2	50.3
Minimum	15.32	15.3
Standard Deviation	11.00	9.07

The box plot compares ALT levels before (ALT) and after (ALT2) an intervention (Fig. 8). Both the median and mean values slightly decreased post-intervention, suggesting a modest reduction in ALT levels. The distribution of the values (IQR and whiskers) remained fairly similar between the two groups, indicating consistent variability. However, the ALT group shows a slightly higher maximum value, while the lower end remained unchanged. Overall, the data suggest a small downward shift in ALT levels following the intervention, with no major changes in data spread or presence of outliers.

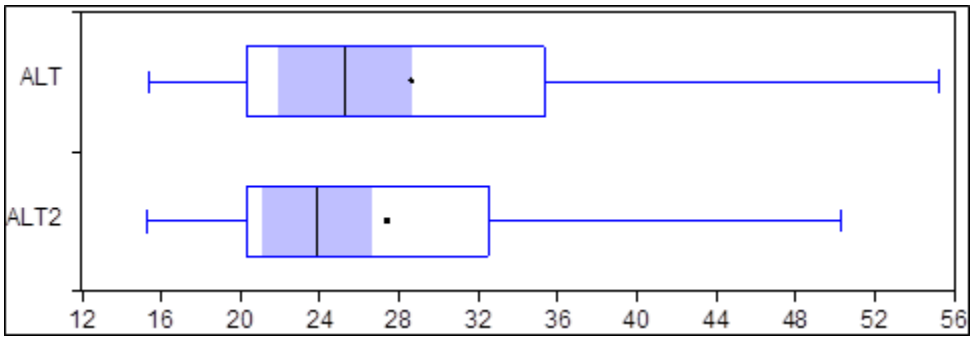

Fig. 8. ALT: Boxplot – comparison of measurements before (ALT) and after the given recommendations (ALT2).

4.8. Urea and Creatinine

Both urea and creatinine showed statistically significant increases (Table 10 & Table 11). Urea median increased from 7 to 7.25 mmol/L (test statistic 4.45, p = 0.00), and creatinine median rose from 75.45 to 76.5 mmol/L (test statistic 3.38, p = 0.00).

Table 10. Descriptive statistic of urea.

Indicator	Before	After
Average	7.2	7.5
Median	7.0	7.25
Maximum	9.5	10.11
Minimum	5.0	6.3
Standard Deviation	0.93	0.95

The box plot shows that urea levels remained relatively stable before (Urea) and after (Urea2) the intervention, with only slight increases in the median and mean values (Fig. 9). The overall spread of values is similar, but Urea2 has slightly more outliers on the higher end. This suggests a small upward shift in central tendency with no major changes in variability.

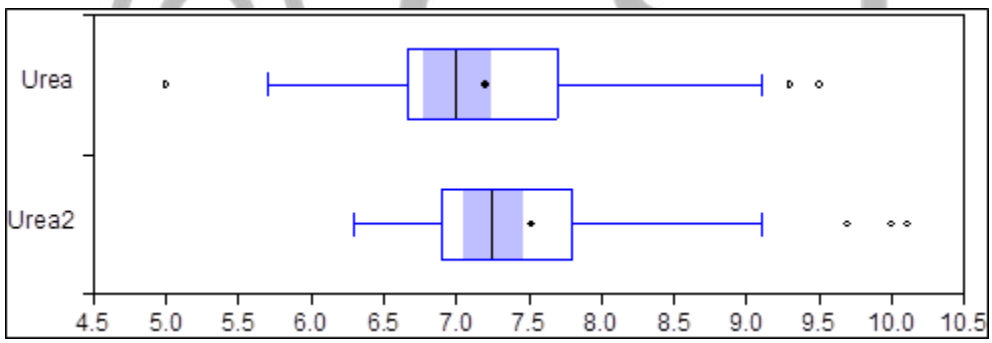

Fig. 9. Urea: Boxplot – comparison of measurements before (Urea) and after the given recommendations (Urea2).

Table 11. Descriptive statistic of creatinine.

Indicator	Before	After
Average	81.9	84.3
Median	75.45	76.5
Maximum	142.3	150.3
Minimum	50.5	50.35
Standard Deviation	21.04	22.30

The box plot compares creatinine levels before (Kreatina) and after (Kreatina2) an intervention. Both the median and mean values remain quite similar, suggesting no significant change in central tendency (Fig. 10). The spread of the data is also comparable, although Kreatina2 shows a slightly narrower interquartile range, indicating slightly reduced variability. Outliers are present in both groups, particularly on the higher end, but their distribution remains consistent, implying that the intervention did not significantly impact creatinine levels overall.

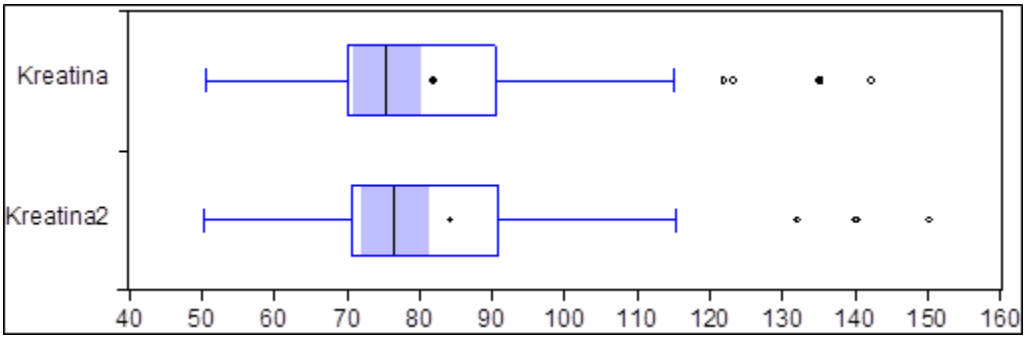

Fig. 10. Creatinine: Boxplot – comparison of measurements before (Kreatina) and after the given recommendations (Kreatina2).

The analysis showed statistically significant differences in median values of 8 out of 10 blood parameters analyzed. No significant differences were found for leukocytes and AST. Except for ALT, which decreased by approximately 1.4 U/L, all other parameters showed an increase in median values following dietary supplement recommendations.

4.9. Nutritional and Supplementation Guidelines for Oncology Patients

Supplements must be used only with the advice of a healthcare professional to ensure safety and effectiveness. Staying well-hydrated throughout the day is important, with water, herbal teas, or electrolyte drinks recommended. Portion sizes should be tailored to each patient's individual needs and tolerance levels. The menu (Table 12) that we recommended for future use provides a balanced intake of protein, fiber, vitamins, and minerals essential for oncology patients.

Table 12.One-Week Daily Nutrition Menu with Recommended Supplements for Oncology Patients

Day	Meal	Food	Supplements
1	Breakfast	Oatmeal with fortified almond milk, blueberries, 1 boiled egg	Multivitamin (B12, folate, vitamin D)
	Snack	Greek yogurt with honey and walnuts	Omega-3 (fish oil)
	Lunch	Grilled chicken breast, quinoa, steamed broccoli, mixed green salad	Vitamin D (if prescribed)
	Snack	Apple slices with almond butter	Probiotic
	Dinner	Lentil stew, roasted sweet potatoes, steamed green beans	Iron (if anemia present)
	Evening Snack	Low-fat cottage cheese, herbal tea	-
2	Breakfast	Smoothie with banana, spinach, protein powder	Multivitamin
	Snack	Handful of mixed nuts	Omega-3
	Lunch	Baked salmon, brown rice, steamed asparagus	Vitamin D
	Snack	Carrot sticks with hummus	Probiotic
	Dinner	Chickpea curry, whole-grain bread, sautéed kale	Iron

Day	Meal	Food	Supplements
	Evening Snack	Fresh berries	-
3	Breakfast	Whole grain toast with avocado, 1 boiled egg	Multivitamin
	Snack	Pear slices with cottage cheese	Omega-3
	Lunch	Turkey breast sandwich on whole grain bread, side salad	Vitamin D
	Snack	Smoothie with mixed berries and almond milk	Probiotic
	Dinner	Baked cod, mashed sweet potatoes, steamed carrots	Iron
	Evening Snack	Herbal tea with a small piece of dark chocolate	-
4	Breakfast	Oatmeal with chia seeds and sliced banana	Multivitamin
	Snack	Greek yogurt with flaxseeds	Omega-3
	Lunch	Grilled tofu, quinoa salad with mixed veggies	Vitamin D
	Snack	Cucumber slices with guacamole	Probiotic
	Dinner	Beef stew with root vegetables	Iron
	Evening Snack	Baked apple with cinnamon	-
5	Breakfast	Smoothie with spinach, pineapple, protein powder	Multivitamin
	Snack	Handful of pumpkin seeds	Omega-3
	Lunch	Roasted chicken, brown rice, steamed broccoli	Vitamin D
	Snack	Celery sticks with peanut butter	Probiotic
	Dinner	Baked salmon, quinoa, sautéed zucchini	Iron
	Evening Snack	Low-fat yogurt	-
6	Breakfast	Whole grain toast with peanut butter and sliced strawberries	Multivitamin
	Snack	Mixed nuts	Omega-3
	Lunch	Lentil soup, whole grain roll, side salad	Vitamin D
	Snack	Fresh fruit salad	Probiotic
	Dinner	Grilled turkey burger, roasted vegetables	Iron
	Evening Snack	Herbal tea	-
7	Breakfast	Scrambled eggs with spinach and tomatoes	Multivitamin
	Snack	Smoothie with mixed berries and almond milk	Omega-3
	Lunch	Baked cod, mashed potatoes, steamed green beans	Vitamin D
	Snack	Carrot sticks and hummus	Probiotic
	Dinner	Chickpea curry with brown rice	Iron
	Evening Snack	Low-fat cottage cheese	-

5. Conclusion

This study holds significant importance as it provides empirical evidence on the impact of dietary supplements on the blood health of cancer patients. By employing robust statistical methods such as the Wilcoxon Signed Rank Test, the analysis demonstrates that nutritional interventions can lead to measurable improvements in several key blood parameters, including hemoglobin, erythrocytes, platelets, iron, and creatinine. These changes are not only statistically significant but also clinically relevant, suggesting potential benefits for overall patient health and treatment resilience. Importantly, the findings open avenues for integrating dietary supplementation as part of supportive cancer care strategies. Hospitals and oncology clinics may use this data to develop personalized nutritional plans for patients undergoing chemotherapy or other intensive treatments. Moreover, the results emphasize the need for regular blood monitoring to assess the effectiveness of dietary changes over time. As a further extension, future research could include a larger and more diverse sample size, incorporate a control group, or examine different types of cancer and their unique nutritional needs. Additionally, a longitudinal follow-up beyond six months could offer insights into the sustainability of these improvements and potential long-term benefits. Studies combining biochemical analysis with patient-reported outcomes such as energy levels or quality of life would also enhance understanding of the real-world impact. This work serves as a valuable contribution to evidence-based nutritional oncology and encourages interdisciplinary collaboration between dietitians, oncologists, and researchers. With further validation, these insights could inform national guidelines and improve clinical outcomes for cancer patients worldwide.

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