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Assessing the Nutritional Impact of Cannabinoids in Patients with Advanced Cancer

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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Original Research Article

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ABSTRACT

Aim: Patients with Advanced Cancer suffer with poor quality of life, nutritional issues and they suffer with various symptom burden. Cannabinoids are implicated in relieving various symptoms and pain in cancer patients. There are also reports that starting Cannabinoids could improve their Nutritional status in these patients with advanced cancer.

Methodology: Forty advanced cancer patients are assessed at Basavatarakam Hospital (BIACH&RI), and nutritional status were measured through structured tools like Patient-Generated Subjective Global Assessment (PG-SGA), Nutritional risk screening tool (NRS). Data was collected through telephonic interviews/ patient reviews. Patients were given CannaBliss in a thick paste or oil-like substance, was administered through transmucosal application or by applying it on the gums above the teeth using fingers. Patients were assessed at two time points for their Nutritional status, (T1=At the time of Recruitment, T2=At three weeks) Confounding variables, such as age, sex, were controlled by setting strict inclusion criteria and collecting detailed baseline data, which allowed for statistical adjustments. To test the hypothesis, paired t-tests, Chi- square tests were likely applied, comparing nutritional status between the two time points (T1 and T2) to determine the impact of the cannabinoids.

Results: Patients who were treated with Cannabis showed Moderate improvement in the PG-SGA and stable in NRS Scores, there was some amount of difference which was not statistically significant.

Conclusion: The study highlights due to the complex nature of nutritional status in patients with advanced cancer, evaluation by NRS Score may not be alone sufficient and for comprehensive assessment PG-SGA Scale may be better scale, because even though patients are having severe feeding related issues they are still in low risk with NRS Score. The NRS Tool, which assesses nutritional status and illness severity, may not be ideal for short-term studies like this three-week follow-up. It may not fully capture the nutritional challenges of advanced-stage cancer patients who are unable to eat, indicating the need for a more detailed tool like PG-SGA scale.

Keywords: Advanced cancer; nutritional status; cannabinoids.

1. INTRODUCTION

Cancer is a condition arising from genetic or epigenetic changes in somatic cells, leading to aberrant cell proliferation that can potentially spread to various parts of the body. It represents a specific category within neoplasms, characterized by uncontrolled cell growth forming a lump or mass, with the possibility of diffuse distribution [1]. It is a disease of uncontrolled proliferation by transformed cells subject to evolution by natural selection [2].

Hippocrates (460–370 B.C.E.) provided comprehensive descriptions of various diseases, including lesions on the skin, breasts, stomach, cervix and rectum, which he classified into early-stage and "occult" cancers. He recommended cauterization and ointments for treating early-stage cancers. Notably, Hippocrates coined the term "cancer" from the Greek word "karkinoma," meaning crab, possibly due to the resemblance of spreading cancers to crab claws. His theory of cancer, which endured for over 1,300 years, was based on the balance of four body humors—blood, phlegm, yellow bile and black bile—asserting that an excess of black bile caused cancer [3].

Telangana, a southern state in India, has recently seen a rise in cancer cases, with an incidence rate of 72.6 per 1,00,000 people in 2016. The survival rate is lower for men, with a mortality-to-incidence ratio of 0.81, compared to 0.70 for women. Among its neighboring states, only Andhra Pradesh and Odisha have worse cancer survival rates. Hyderabad, the state's capital, has the highest breast cancer incidence rate in India at 48 per 1,00,000, with a significant number of aggressive breast cancer cases in women under 50. Among men in Hyderabad, mouth, lung and tongue cancers are most common [4].

The IARC's (International Agency for Research on Cancer) 2022 estimates, relying on the most reliable data sources available in various countries, emphasize the escalating weight of cancer, its disproportionate impact on marginalized populations, and the urgent call to address global cancer inequities. Throughout 2022, an approximate 20 million new cases of cancer and 9.7 million associated deaths were reported. The projected number of individuals surviving within five years after a cancer diagnosis reached 53.5 million. With approximately one in five individuals developing cancer during their lifetime, the disease claims approximately one in nine men and one in twelve women [5].

Cancer, particularly in its advanced stages, poses multifaceted challenges to patients, impacting not only their physical health but also their nutritional well-being and overall quality of life. In recent years, the exploration of alternative interventions, such as cannabinoids, has gained considerable attention in the field of advanced cancer care. Cannabinoids, derived from the Cannabis plant, exhibit therapeutic potential that extends beyond pain management to potential effects on nutritional intake, side effect profiles and overall well-being of advanced cancer patients.

Cannabinoids are natural compounds found in Cannabis sativa L. [6]. They are produced in glandular trichomes, which are hair-like structures on the plant. Over 100 phytocannabinoids have been identified. It's believed that cannabinoid biosynthesis has been occurring for millions of years and humans have used cannabinoids as medicine for thousands of years. The production of cannabinoids is likely an evolutionary strategy that enhances plant fitness and provides protection against herbivores, pathogens, and UV radiation.

Cannabis, also known as marijuana, contains chemical compounds called cannabinoids, such as THC (intoxicating) and CBD (non-intoxicating). It's becoming more popular despite federal illegality, with many US states legalizing medical and recreational use. CBD-only products have uncertain regulatory status but are widely available. Cannabis use, especially among older adults, is increasing. Some evidence suggests cannabinoids can help manage cancer-related symptoms like pain, anxiety, and nausea. However, research is limited, and understanding the use and effects of CBD-only products is incomplete. Clinicians need to grasp patient experiences with medical cannabis to offer proper guidance, given changing attitudes and barriers to research [7].

Dell [8] In this study they looked into how cannabinoids from medical marijuana might help cancer patients regain their appetite. Cancer and its treatments can often cause a loss of appetite and changes in how food tastes, making it hard for patients to eat enough and keep their weight up. Cannabinoids interact with specific receptors in the body that play a role in controlling appetite and how enjoyable food is. Some studies suggest that medical marijuana could improve appetite and slow down weight loss in cancer patients, but larger studies show that other medications may be more effective for this purpose. Many patients have reported that medical marijuana helps them eat better. It could be a useful option for cancer patients struggling with appetite loss, especially if regular medications have drawbacks.

Bar-Sela [9] In this preliminary study demonstrated that dosage-controlled cannabis capsules containing tetrahydrocannabinol (THC) and cannabidiol (CBD) could lead to weight increases in advanced cancer patients with cancer-related cachexia and anorexia syndrome (CACS). The capsules contained two fractions of oil-based compounds with a planned treatment of 2 × 10 mg per 24 hours (THC 9.5 mg and CBD 0.5 mg). Of the 17 patients who started treatment, three achieved the primary objective of a ≥10% weight gain, and three others maintained stable weights. Quality of life improvements included reduced appetite loss, enhanced mood, and decreased pain and fatigue. Although the results were promising, the small sample size and lack of statistical significance in TNF-α level changes highlight the need for a larger, more comprehensive study. The study reported adverse reactions to cannabis capsules, such as tiredness, dizziness, disorientation, anxiety, and hallucinations, which occurred 1 to 2 hours after intake and lasted for 2 to 3 hours. These side effects led to dosage adjustments, with some patients reducing their intake from 10 mg to 5 mg to manage these effects. Despite these adverse reactions, the study found that 50% of patients who completed the trial experienced a weight increase of ≥10%, and 83% reported a significant reduction in appetite loss complaints, indicating potential benefits for managing cancer-related cachexia and anorexia syndrome.

Rodriguez-Almaraz [10] assessed the impact of tumor cachexia and weight loss in cancer care, which affects up to 80% of cancer patients and contributes significantly to cancer-related deaths, particularly among brain tumor patients. Malnutrition due to chemotherapy and radiotherapy further exacerbates these issues, negatively impacting patient outcomes and well-being. Recent research has highlighted the potential benefits of cannabinoids from cannabis in palliative care. For instance, the study by Brisbois in 2011 demonstrated that THC could enhance food taste and increase appetite in advanced cancer patients. Currently, dronabinol is the only FDA-approved cannabinoid for managing weight loss in AIDS patients and chemotherapy-induced nausea in cancer patients. Although cannabinoids are seen as a promising complementary therapy to improve nutritional intake and quality of life in brain tumor patients, more comprehensive studies are required to fully understand their effects in conjunction with standard care.

We want to evaluate if there is any impact of Medical Cannabis on Nutritional status in End-stage Cancer patients specially in South India set-up, we wanted to assess using standardized tools like PG-SGA and NRS. The 100% cannabis extract, containing a full range of cannabinoids, interacts with the body's endocannabinoid system (ECS) to help regulate functions and maintain balance. CBD and THC in the extract can relieve pain, reduce nausea, vomiting and provide a calming effect without numbness. Emerging research suggests potential anti-tumor properties. After chemotherapy, Pain relief strong aids with insomnia, appetite loss, stress, anxiety and pain, promoting overall well-being.

2. MATERIALS AND METHODS

2.1 Place of the Study

The entire study was planned at Department of Pain and Palliative Medicine, Basavatarakam Indo American Cancer Hospital & Research Institute (BIACH&RI), Hyderabad. The study duration was for 8 months.

2.2 Selection of the Sample

This was a prospective, observational study designed to assess the impact of cannabinoid treatment on the nutritional status of advanced cancer patients.The study included advanced cancer patients of both genders who were receiving treatment at Basavatarakam Cancer Hospital. Forty cancer patients were included, 45% males and 55% females, with various types of cancers such as cell carcinoma of the right lung; colon cancer; prostate cancer (2 cases); adenocarcinoma of the lung; muscle-invasive carcinoma of the bladder; cervical cancer (4 cases); ALK+ large B cell lymphoma; endometrial cancer; metastatic breast carcinoma (3 cases); ovarian cancer; left buccal mucosa cancer; refractory B-cell lymphoblastic leukemia; post-cricoid cancer; urethral cancer; breast cancer with bone metastases; metastatic anorectal melanoma; sigmoid colon cancer (4 cases); stomach cancer (2 cases, including liver metastasis in one); relapsed right breast cancer; metastatic synovial sarcoma with lung metastases; Ewing's sarcoma of the right medial cuneiform bone; carcinoma of the supraglottis; pancreatic cancer (4 cases); rectal carcinoma; adreno-cortical carcinoma; oral cancer; and uterine cancer combined with rectal cancer.The sample were selected from the outpatient clinic of palliative medicine clinic of Basavatarakam Indo American Cancer Hospital and Research Institute (BIACH&RI), using a purposive sampling method, focusing on patients receiving treatment at (BIACH&RI). Inclusion criteria were a diagnosis of advanced-stage cancer, current treatment at the hospital, consent to participate and a prescription for cannabis leaf extract. Exclusion criteria included patients unwilling for consent, expired within 3 weeks of initiation, not responding to phone calls, patients who did not used the prescribed drug, likely as shown in the study flowchart.

2.3 Data Collection

Understanding the impact on nutritional status of advanced cancer patients using cannabinoids using standardized tools like the Patient-Generated Subjective Global Assessment (PG-SGA), Nutritional risk screening tool (NRS). Data were collected at two time points (T1=At the time of recruitment, T2=At three weeks) using structured tools like PG-SGA and NRS.

Patient-generated subjective global assessment (PG-SGA): The Patient-Generated Subjective Global Assessment (PG-SGA) is a tool used primarily in clinical settings to assess nutritional status, especially in patients with chronic illnesses or those undergoing treatments that may affect their nutritional health. The PG-SGA is divided into several sections that are either self-reported by the patient or completed by a healthcare professional.

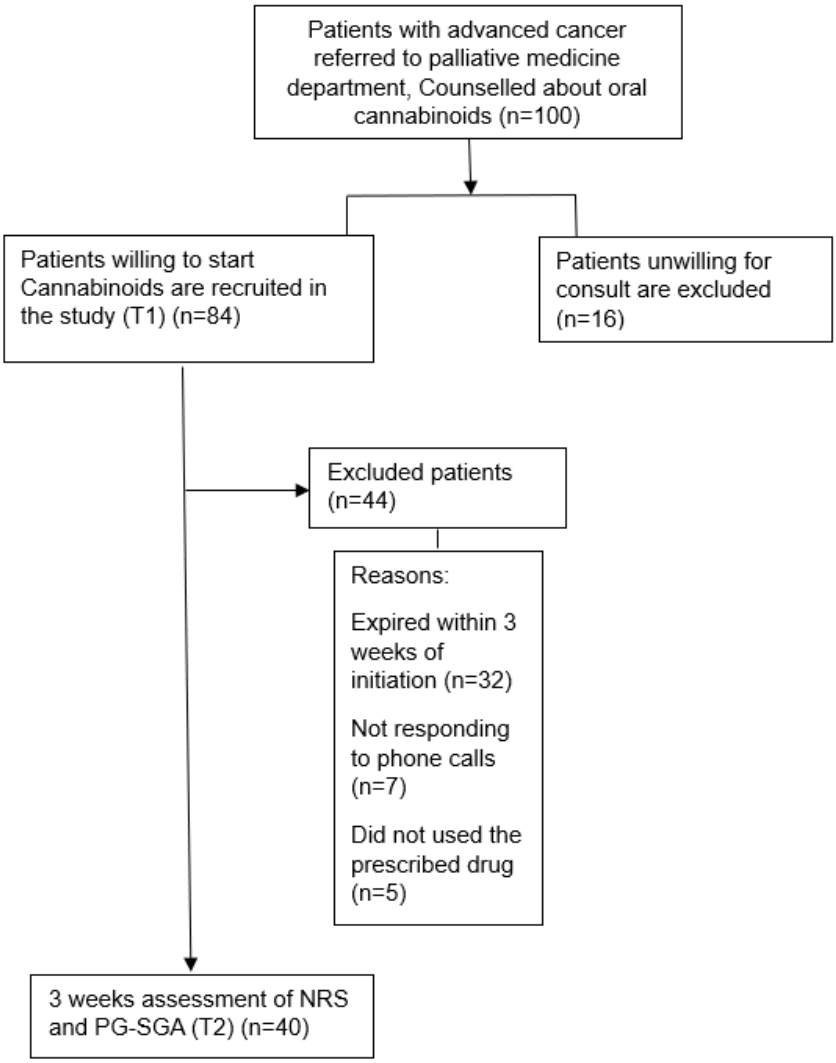

Fig. 1. The Study Flowchart

The first four boxes, which form the PG-SGA Short Form (SF), covers Weight History, Food Intake, Symptoms, and Activities and Function. These sections capture key variables such as recent weight changes, dietary intake, symptoms affecting nutrition (e.g., nausea, vomiting), and the patient's overall functional status. Additional sections assess physical examination findings, disease impact, and metabolic stress, contributing to a comprehensive nutritional evaluation.

The PG-SGA is scored by summing the points from the various sections, with higher scores indicating greater nutritional risk. This score helps guide nutritional interventions, ranging from routine monitoring to urgent nutritional support, depending on the severity of the patient's condition [11].

Nutritional Risk Screening 2002 (NRS-2002): is a tool developed by the European Society for Clinical Nutrition and Metabolism (ESPEN) to identify patients at risk of malnutrition, particularly in hospital settings. It is designed to assess both the presence of undernutrition and the risk of developing malnutrition due to the severity of the patient's disease. The NRS-2002 is composed of two main components: impaired nutritional status, severity of disease.

The NRS-2002 scoring system involves summing points from these assessments. A total score of 3 or more indicates that the patient is at nutritional risk and may require a more detailed nutritional assessment or intervention. The tool is particularly useful because it combines clinical judgment with objective data, enabling healthcare providers to prioritize nutritional

interventions for those who are most in need. The main variables assessed include weight loss percentage, BMI, food intake reduction, and the increased nutritional needs due to illness severity [12].

2.4 Mode of Data Collection

Data collection was primarily conducted through telephonic interviews/ direct patient reviews during clinical visits with patients who had been prescribed cannabis leaf extract for their advanced cancer treatment. Contact numbers were obtained from the pharmacy records of patients, while appropriate authorization was obtained to access the patients' contact information. Data collection was carried out through telephonic interviews and direct patient reviews during clinical visits. Contact numbers were retrieved from pharmacy records, but only after securing necessary permissions from the hospital's ethical review board and ensuring compliance with patient confidentiality protocols. Patients who had been prescribed cannabis leaf extract for their advanced cancer treatment were contacted to gather detailed information about their nutritional status and treatment outcomes.

2.5 Dosage of Cannabinoids

The cannabis leaf extract used in this study was a 100% Vijaya leaf extract known as CannaBliss-Ultra Relief Natural Medical Cannabis Extract (Hemp Organics Private Limited, Bengaluru) containing 5000mg per 5ml, including a balanced 1:1 CBD to THC ratio, plus CBG (cannabigerol), CBN (cannabinol) and more. Each prescription included one syringe with 5ml of the cannabis extract, intended for individual use. This dosage was formulated to last between 20 to 30 days per person. The extract, provided as a thick paste or oil-like substance, was administered through transmucosal application or by applying it on the gums above the teeth using fingers. All patients in the study received the cannabis extract in the same form and with the same method of administration, with no variation.

2.6 Statistical Analysis

In statistical analysis, the variables were first characterised using descriptive statistics, using frequencies for categorical variables, All statistical analysis were performed using IBM SPSS Statistics, version 24. To test the hypothesis, a paired sample t-test was conducted to compare the mean PG-SGA scores at T1 and T2. Additionally, Chi-square test was used to assess changes in PG-SGA Global Assessment Categories, while for BMI and Total NRS scores were been evaluated by using percentages.

2.7 Aim of Study

Impact of Cannabinoid use on Nutritional status

2.8 Scales used for Assessment

PG-SGA developed by Ottery [11] and NRS developed by Kondrup [12], which were included in Appendices, where these scales were employed at two distinct time points at (T1)- At recruitment and (T2)- At three weeks. While patients referred to palliative care department usually had advanced disease with limited life expectancy. With the logistic issues prevailing in this population we have found a 3 week period of follow up as an adequate time balancing the limited life expectancy and allowing the drug to show physiologic effects.

3. RESULTS AND DISCUSSION

Baseline Demographic Characteristics of patients (n=40) have been collected. Majority of the patients were females and 51-60 years age group (37.5%).

3.1 Age Categories

Age Range	Count	Percentage (%)
16-30	01	2.5%
31-40	03	7.5%
41-50	07	17.5%
51-60	15	37.5%
61-70	10	25.0%
71-80	04	10.0%

3.2 Age Statistics

Statistic	Value
Mean	56.0
SD	14.2

3.3 Gender Distribution

Gender	Percentage (%)
Male	45%
Female	55%

PG SGA tool: The mean total PGSGA at T1 and T2 were 10.13, 9.78 respectively.

Table 1. Showing Total PGSGA at T1 and T2

Total PG-SGA	Mean	SD	CI	t[a]/df/p value
T1 T2	10.13 9.78	4.17 4.25	-0.001 to 0.701	2.01/39/0.051

a.paired sample t test

The paired sample t-test was employed to determine whether there was a statistically significant difference between the two time points. The results show a mean difference between T1 and T2 scores of 0.35 (T1 mean = 10.13, T2 mean = 9.78) with a standard deviation of 4.17 for T1 and 4.25 for T2. The confidence interval (CI) for the mean difference ranges from -0.001 to 0.701, indicating that the true mean difference could be very small or even zero.

The t-value is 2.01, with 39 degrees of freedom (df), resulting in a p-value of 0.051, ($p < 0.05$).

Table 2. PGSGA Global Assessment Categories

No statistically significant difference found in the staging in the PGSGA Categories p=0.368

Global Assessment Categories T1	T2	A (n%)	B (n%)	C (n%)	Total (n%)	p value
	A	9(22.5%)	0	0	9(22.5%)	0.368
	B	1(2.5%)	21(52.5%)	0	22(55%)	
	C	0	1(2.5%)	8(20%)	9(22.5%)	
Total		10(25%)	22(55%)	8(20%)	40(100.0%)	

The PG-SGA (Patient-Generated Subjective Global Assessment) Global Assessment Categories provide an overall classification of patients' nutritional status, typically divided into three categories: A (well-nourished), B (moderately malnourished), and C (severely malnourished) based on Categories-Weight, Nutrient Intake, Nutrition Impact Symptoms, Functioning, Physical Exam. In this study, the distribution of patients across these categories was assessed and the results are shown in the Table 2. The results indicate no statistically significant difference in the staging distribution of patients across the PG-SGA categories (p=0.368). This suggests that there were no substantial changes in the overall nutritional status classification of patients over the study period.

The majority of patients (55%) were categorized as moderately malnourished (Category B), while 25% were well-nourished (Category A) and 20% were severely malnourished (Category C).

Triaging based on PGSGA:

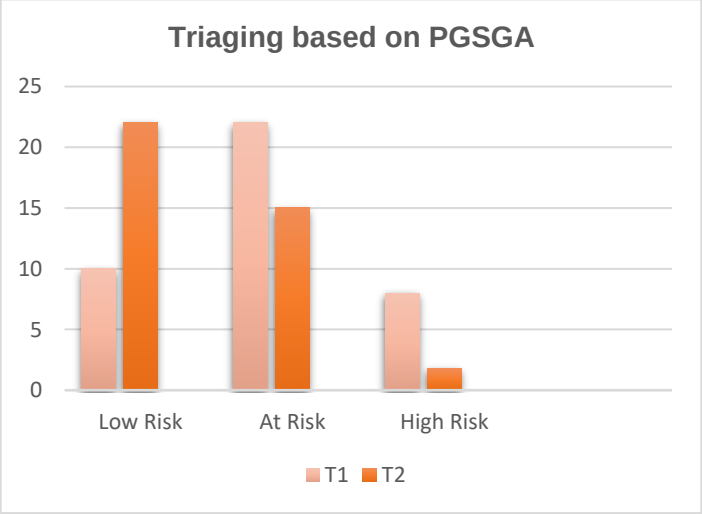

Fig. 2. Showing Triaging based on PGSGA

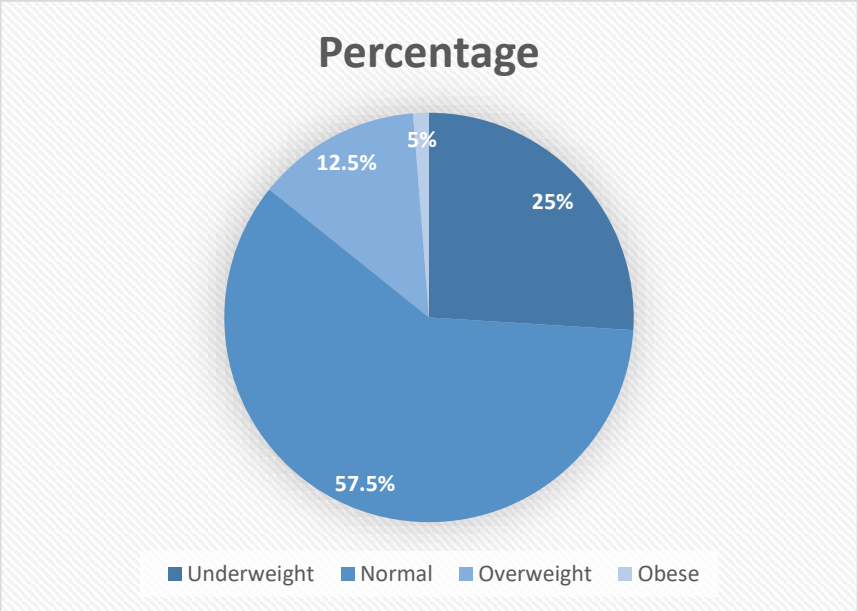

Fig. 3. Showing % of BMI Categories

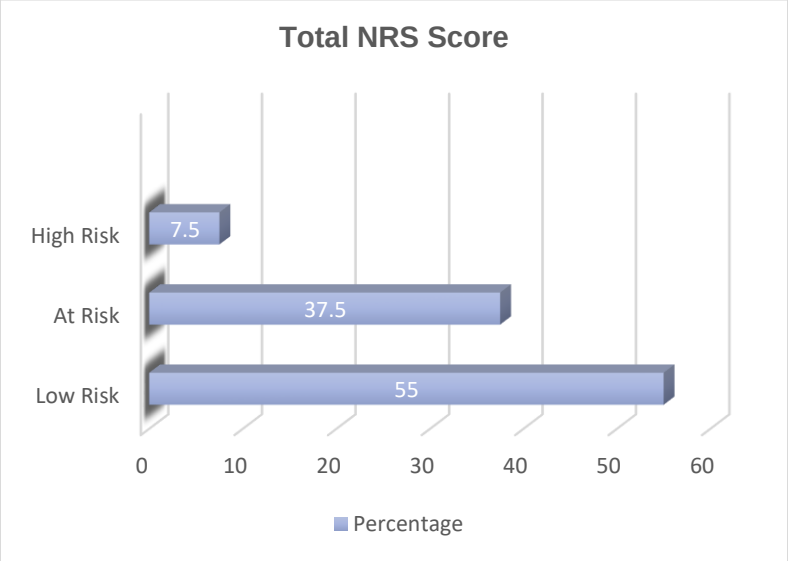

Fig. 4. Graph showing Total NRS Score

In this study of 40 patients, PG-SGA results indicated that 55% were moderately malnourished, 25% well-nourished, and 20% severely malnourished, with no significant changes over time (p=0.368), comparing with a previous study findings with a larger study where 89% were moderately or severely malnourished [13].

Nutritional risk screening tool (NRS):

Based on the distribution of patients across BMI categories, the findings reveal diverse nutritional statuses. A significant portion of patients (25%) falls into the underweight category (<18.5). The majority of patients (57.5%) are in the normal BMI range (18.5-24.9), indicating a generally healthy weight status. A smaller group (12.5%) is classified as overweight (25.0-29.9). Finally, 5% of patients are classified as obese (>30.0). Overall, while the majority are within a healthy weight range, addressing the needs of those who are underweight or at risk of overweight and obesity is crucial for comprehensive nutritional risk management. While comparing to a previous study, nutritional status of 86 cancer patients at a

university hospital, comparing adults and older adults across two cancer categories. Older adults showed a higher frequency of underweight (24.4% vs. 16.3%, $p < 0.01$) and lower overweight rates (7% vs. 15.1%, $p < 0.01$) compared to adults [14].

Table 3. NRS total score statistics

Statistic	Value
Mean	2.24
SD	1.43

The majority of the patients, 55%, fall into the 0-2 points category, indicating a low risk of nutritional issues. This suggests that more than half of the patients have a relatively stable nutritional status. However, 37.5% of the patients scored 3-4 points, placing them in the "at risk" category. This substantial portion indicates a significant number of patients who may benefit from early nutritional interventions to prevent deterioration. Finally, 7.5% of patients are in the high-risk category, with scores of 5 or higher. This small group represents individuals with an immediate need for nutritional support to avoid potential adverse health outcomes, while the results were same even at three – week follow up as there were no major changes in the weights of the patients as the main variables assessed include weight loss percentage, BMI, food intake reduction, and the increased nutritional needs due to illness severity. The distribution of scores highlights the importance of regular nutritional assessments to identify at-risk patients early and provide appropriate interventions, suggesting a more balanced risk profile compared to previous findings where one-third were high-risk and poor nutritional status [15].

Malnutrition significantly impacts cancer patients, exacerbating complications and reducing quality of life. Effective nutritional risk screening and dietary assessment are crucial for personalized nutritional support [16]. Traditionally, we can recommend health-related measures, but for cancer patients experiencing loss of appetite and nausea, lifestyle changes can also be helpful. Even for obese patients, we suggest focusing on protein intake, avoiding spicy foods and addressing specific issues like oral mucositis with targeted interventions, in addition to continuing medical cannabis treatment. Using the Nutritional Risk Screening (NRS) metric, most patients appear to be at low risk. However, despite being categorized as low risk, many patients still struggle to eat. This is because NRS primarily measures impaired nutritional status and disease severity, and doesn't account for other factors like fluid retention or muscle mass, which can affect weight changes. So, even though there are weight changes, they may not be reflected as high risk in the NRS.

A systematic review conducted over the past 20 years examined six randomized controlled trials on the effectiveness of cannabinoids in stimulating appetite and oral intake among cancer patients. The review found that cannabinoids do not seem to improve appetite, food intake, weight, chemosensory function, or appetite-related quality of life compared to control groups or placebos [17].

4. CONCLUSION

Cannabinoids have shown moderate improvement which is not statistically significant, results benefited in certain patients, allowing them to better manage their loss of appetite and improve their nutritional intake in better manner. Ultimately, leading to slight changes in the PG-SGA, but even though in the patients in whom we have selected are already in low risk at the time of recruitment, but NRS may not be a correct scale here because it showed stable scores both at T1 and T2 time points, there could be other reasons that these patients might have poor muscle mass, more fluid retention which isn't reflected in NRS scores. The clinical implications of these results suggest that while cannabinoids may provide some benefit in managing symptoms like loss of appetite and improving nutritional intake, their effect on overall nutritional status, as assessed by the NRS, might be limited. This finding implies that the NRS might not fully capture the changes in nutritional status, particularly in patients who already have a low risk at the time of recruitment. For future studies, it would be important to use a more comprehensive assessment tool that can better capture variations in muscle mass, fluid retention and other factors not reflected in the NRS. Additionally, studies should consider a longer follow-up period and include a broader patient population to better evaluate the long-term effects of cannabinoids on nutritional status and related outcomes.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

The author(s) hereby state that no generative AI technologies, such as Large Language Models (e.g., ChatGPT, Copilot) or text-to-image

generators, have been used in the writing or editing of manuscripts.

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ETHICS APPROVAL

As there is a need for conducting ethical and responsible medical research involving human participants, this study has undergone thorough review and approval by Dr. K.Suseela MD. IEC Member Secretary, Institutional Ethics Committee, BIACH&RI, which was held on 71st Institutional Ethics Committee Meeting on 14th February at Basavatarakam Cancer Hospital acquiring EC Ref Code: IEC/2024/60. Bioethical principles of autonomy, beneficience, non maleficence and justice were applied to ensure fairness.

CONSENT

As per international standards or university standards, patient(s) written consent has been collected and preserved by the author(s).

AVAILABILITY OF DATA AND MATERIAL

The datasets analyzed during the current study provided in an open repository.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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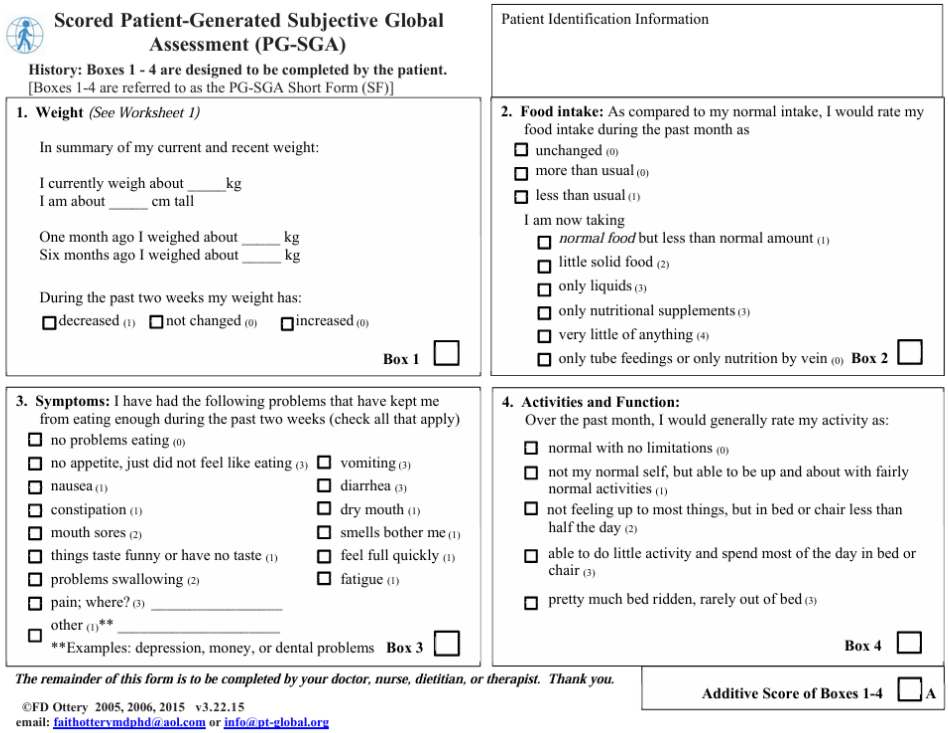
APPENDICES

Appendix A



Scored Patient-Generated Subjective Global Assessment (PG-SGA)

History: Boxes 1 - 4 are designed to be completed by the patient.
[Boxes 1-4 are referred to as the PG-SGA Short Form (SF)]

Patient Identification Information

1. Weight *(See Worksheet 1)*

In summary of my current and recent weight:

I currently weigh about _____kg
I am about _____ cm tall

One month ago I weighed about _____ kg
Six months ago I weighed about _____ kg

During the past two weeks my weight has:
☐ decreased (1) ☐ not changed (0) ☐ increased (0)

Box 1 ☐

2. Food intake: As compared to my normal intake, I would rate my food intake during the past month as
☐ unchanged (0)
☐ more than usual (0)
☐ less than usual (1)

I am now taking
☐ *normal food* but less than normal amount (1)
☐ little solid food (2)
☐ only liquids (3)
☐ only nutritional supplements (3)
☐ very little of anything (4)
☐ only tube feedings or only nutrition by vein (0) **Box 2** ☐

3. Symptoms: I have had the following problems that have kept me from eating enough during the past two weeks (check all that apply)
☐ no problems eating (0)
☐ no appetite, just did not feel like eating (3)
☐ nausea (1)
☐ constipation (1)
☐ mouth sores (2)
☐ things taste funny or have no taste (1)
☐ problems swallowing (2)
☐ pain; where? (3) _____
☐ other (1)** _____
**Examples: depression, money, or dental problems
☐ vomiting (3)
☐ diarrhea (3)
☐ dry mouth (1)
☐ smells bother me (1)
☐ feel full quickly (1)
☐ fatigue (1)

Box 3 ☐

4. Activities and Function:
Over the past month, I would generally rate my activity as:
☐ normal with no limitations (0)
☐ not my normal self, but able to be up and about with fairly normal activities (1)
☐ not feeling up to most things, but in bed or chair less than half the day (2)
☐ able to do little activity and spend most of the day in bed or chair (3)
☐ pretty much bed ridden, rarely out of bed (3)

Box 4 ☐

The remainder of this form is to be completed by your doctor, nurse, dietitian, or therapist. Thank you.

Additive Score of Boxes 1-4 ☐ **A**

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Scored Patient-Generated Subjective Global Assessment (PG-SGA)

Worksheet 1 – Scoring Weight Loss

To determine score, use 1-month weight data if available. Use 6-month data only if there is no 1-month weight data. Use points below to score weight change and add one extra point if patient has lost weight during the past 2 weeks. Enter total point score in Box 1 of PG-SGA.

Weight loss in 1 month	Points	Weight loss in 6 months
10% or greater	4	20% or greater
5-9.9%	3	10- 19.9%
3-4.9%	2	6- 9.9%
2-2.9%	1	2- 5.9%
0-1.9%	0	0- 1.9%

Numerical score from Worksheet 1 ☐

Additive Score of Boxes 1-4 (See Side 1) ☐ **A**

5. Worksheet 2 – Disease and its relation to nutritional requirements:
Score is derived by adding 1 point for each of the following conditions:
☐ Cancer
☐ AIDS
☐ Pulmonary or cardiac cachexia
☐ Chronic renal insufficiency
☐ Presence of decubitus, open wound or fistula
☐ Presence of trauma
☐ Age greater than 65
Other relevant diagnoses (specify) _____
Primary disease staging (circle if known or appropriate) I II III IV Other ____
Numerical score from Worksheet 2 ☐ **B**

6. Worksheet 3 – Metabolic Demand
Score for metabolic stress is determined by a number of variables known to increase protein & caloric needs. **Note:** Score fever intensity or duration, whichever is greater. The score is additive so that a patient who has a fever of 38.8 °C (3 points) for < 72 hrs (1 point) and who is on 10 mg of prednisone chronically (2 points) would have an additive score for this section of 5 points.

Stress	none (0)	low (1)	moderate (2)	high (3)
Fever	no fever	> 37.2 and < 38.3	≥ 38.3 and < 38.8	≥ 38.8 °C
Fever duration	no fever	< 72 hours	72 hours	> 72 hours
Corticosteroids	no corticosteroids	low dose (< 10 mg prednisone equivalents/day)	moderate dose (≥ 10 and < 30 mg prednisone equivalents/day)	high dose (≥ 30 mg prednisone equivalents/day)

Numerical score from Worksheet 3 ☐ **C**

7. Worksheet 4 – Physical Exam
Exam includes a subjective evaluation of 3 aspects of body composition: fat, muscle, & fluid. Since this is subjective, each aspect of the exam is rated for degree. Muscle deficit/loss impacts point score more than fat deficit/loss. Definition of categories: 0 = no abnormality, 1+ = mild, 2+ = moderate, 3+ = severe. Rating in these categories is *not* additive but are used to clinically assess the degree of deficit (or presence of excess fluid).

Muscle Status		Fat Stores	
temples (temporalis muscle)	0 1+ 2+ 3+	orbital fat pads	0 1+ 2+ 3+
clavicles (pectoralis & deltoids)	0 1+ 2+ 3+	triceps skin fold	0 1+ 2+ 3+
shoulders (deltoids)	0 1+ 2+ 3+	fat overlying lower ribs	0 1+ 2+ 3+
interosseous muscles	0 1+ 2+ 3+	**Global fat deficit rating**	**0 1+ 2+ 3+**
scapula (latissimus dorsi, trapezius, deltoids)	0 1+ 2+ 3+	**Fluid status**	
thigh (quadriceps)	0 1+ 2+ 3+	ankle edema	0 1+ 2+ 3+
calf (gastrocnemius)	0 1+ 2+ 3+	sacral edema	0 1+ 2+ 3+
Global muscle status rating	**0 1+ 2+ 3+**	ascites	0 1+ 2+ 3+
		Global fluid status rating	**0 1+ 2+ 3+**

Point score for the physical exam is determined by the overall subjective rating of the total body deficit.

No deficit	score = 0 points	**Again, muscle deficit/loss takes precedence over fat loss or fluid excess.**
Mild deficit	score = 1 point	
Moderate deficit	score = 2 points	
Severe deficit	score = 3 points	

Numerical Score for Worksheet 4 ☐ **D**

Total PG-SGA Score (Total numerical score of A+B+C+D) ☐

Clinician Signature _____ RD RN PA MD DO Other _____ Date _____ **Global PG-SGA Category Rating (Stage A, Stage B or Stage C)** ☐

Worksheet 5 – PG-SGA Global Assessment Categories

	Stage A	Stage B	Stage C
Category	**Well-nourished**	**Moderate/suspected malnutrition**	**Severely malnourished**
Weight	No weight loss **OR** recent non-fluid wt gain	≤ 5% loss in 1 month (≤10% in 6 months) **OR** Progressive weight loss	> 5% loss in 1 month (>10% in 6 months) **OR** Progressive weight loss
Nutrient intake	No deficit **OR** Significant recent improvement	Definite decrease in intake	Severe deficit in intake
Nutrition Impact Symptoms (NIS)	None **OR** significant recent improvement allowing adequate intake	Presence of NIS (Box 3 of PG-SGA)	Presence of NIS (Box 3 of PG-SGA)
Functioning	No deficit **OR** Significant recent improvement	Moderate functional deficit **OR** Recent deterioration	Severe functional deficit **OR** Recent significant deterioration
Physical Exam	No deficit **OR** chronic deficit but with recent clinical improvement	Evidence of mild to moderate loss of muscle mass &/or muscle tone on palpation &/or loss of SQ fat	Obvious signs of malnutrition (e.g., severe loss muscle, fat, possible edema)

Nutritional Triage Recommendations: Additive score is used to define specific nutritional interventions including patient & family education, symptom management including pharmacologic intervention, and appropriate nutrient intervention (food, nutritional supplements, enteral, or parenteral triage).

First line nutrition intervention includes optimal symptom management.

Triage based on PG-SGA point score

0-1	No intervention required at this time. Re-assessment on routine and regular basis during treatment.
2-3	Patient & family education by dietitian, nurse, or other clinician with pharmacologic intervention as indicated by symptom survey (Box 3) and lab values as appropriate.
4-8	Requires intervention by dietitian, in conjunction with nurse or physician as indicated by symptoms (Box 3).
≥ 9	Indicates a critical need for improved symptom management and/or nutrient intervention options.

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Appendix B

Nutrition Risk Screening 2002 (NRS 2002)

Table 1 Screening for nutritional risk

Impaired nutritional status		Severity of disease (≈stress metabolism)	
Absent Score 0	Normal nutritional status	Absent Score 0	Normal nutritional requirements
Mild Score 1	Wt loss >5% in 3 months Or Food intake below 50–75% of normal requirement in preceding week	Mild Score 1	Hip fracture Chronic patients, in particular with acute complications: cirrhosis (11), COPD (12) *Chronic hemodialysis, diabetes, oncology*
Moderate Score 2	Wt loss >5% in 2 months Or BMI 18.5 – 20.5+impaired general condition Or Food intake 25–50% of normal requirement in preceding week	Moderate Score 2	Major abdominal surgery (13–15). Stroke (16) *Severe pneumonia, hematologic malignancy*
Severe Score 3	Wt loss >5% in 1 month (≈ >15% in 3 months (17)) Or BMI <18.5+impaired general condition (17) Or Food intake 0–25% of normal requirement in preceding week in preceding week.	Severe Score 3	Head injury (18, 19) Bone marrow transplantation (20) *Intensive care patients (APACHE 10*
Score:	+		
Total score:			

Calculate the total score:

1. Find score (0–3) for Impaired nutritional status (only one: choose the variable with highest score) and Severity of disease (≈ stress metabolism, i.e. increase in nutritional requirements).
2. Add the two scores (→ total score)
3. If age ≥70 years: add 1 to the total score to correct for frailty of elderly
4. If age-corrected total ≥3: start nutritional support

Note: See text on p. 330: as a prototype, a patient with a score = 1 in severity of disease is admitted to hospital due to complications associated with a chronic disease. The patient is weak but out of bed regularly. Protein requirement is increased, but can be covered by oral diet or supplements in most cases. The prototype of score = 2 is a patient confined to bed due to illness, e.g. following major abdominal surgery or due to severe infection. Protein requirement is substantially increased but can be covered, although artificial feeding is required in many cases. The prototype of score = 3 is the intensive care patient with assisted ventilation, inotropic drugs, etc. Protein requirement is increased to the extent, that in most cases it cannot be covered by artificial feeding, but protein breakdown and N loss can be attenuated significantly.

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