ABSTRACT

A large amount of organic waste is generated every year, mainly due to food waste, causing negative impacts on the environment. At the same time, cancer incidence and mortality are rapidly growing worldwide and have a great impact on patients' quality of life, especially during chemotherapy treatment. Therefore, the aim of this study was to develop a sustainable gelato with orange peel for cancer patients undergoing chemotherapy. The orange peel gelato developed presented protein content of high biological value, easily digested fat, low glycemic carbohydrate, phenolic and flavonoid content, and antioxidant potential. The orange peel may be used to develop sustainable gelato aiming to increase the intake of bioactive compounds in the general population, control chemotherapy symptoms of oncological patients and to contribute to the environment by reducing the generation of organic waste.

Keywords: Edible Gelato; Food waste; Sustainability; Gastronomy; Oncological treatment.
RESUMO
Uma grande quantidade de resíduos orgânicos é gerada todos os anos, principalmente devido ao desperdício de alimentos, causando impactos negativos ao meio ambiente. Ao mesmo tempo, a incidência e a mortalidade por câncer estão crescendo rapidamente em todo o mundo e têm um grande impacto na qualidade de vida dos pacientes, especialmente durante o tratamento quimioterápico. Portanto, o objetivo deste estudo foi desenvolver um gelato sustentável com casca de laranja para pacientes oncológicos em tratamento quimioterápico. O gelato de casca de laranja desenvolvido apresentou teor de proteína de alto valor biológico, gordura de fácil digestão, carboidrato de baixo índice glicêmico, teor de fenólicos e flavonoides e potencial antioxidante. A casca da laranja pode ser utilizada para desenvolver gelato sustentável com o objetivo de aumentar a ingestão de compostos bioativos na população em geral, controlar os sintomas quimioterápicos de pacientes oncológicos e contribuir com o meio ambiente reduzindo a geração de resíduos orgânicos.

Palavras-chave: Gelato comestível; Desperdício de comida; Sustentabilidade; Gastronomia; Tratamento oncológico.
INTRODUCTION

Recent data show that 1.3 billion metric tons of food are wasted yearly; one-third of food becomes waste (Brennan; Browne, 2021). The trash generated directly impacts the environment, human health, and the economy and represents a significant barrier to achieving a sustainable future (Campbell and Feldpausch, 2022). Yet, paradoxically, in 2019, 25.9% of the global population was affected by hunger or did not have access to quality food in sufficient quantities (Fao et al., 2020).

Among the fruits that suffer the most discards are avocado (31%), pineapple (24%), orange (22%), banana (40%), papaya (30%), mango (27%) and strawberry (39%) (Storck et al., 2013). In addition, more than 40 million tons of industrial citrus residues are wasted worldwide. This massive amount of waste represents a significant barrier to achieving a sustainable future and has drawn the attention of researchers seeking alternatives to reduce impacts on the environment, human health, and the economy (Campbell; Feldpausch, 2022).

A large portion of orange production is addressed to the industrial extraction of citrus juice leading to vast amounts of agricultural residues, including seeds, peel, and segment membranes. Peels represent between 30% of the weight of the whole orange fruit and remain the primary by-product. Therefore, orange peel has been highlighted as an available and inexpensive attractive source of active ingredients for nutraceutical and functional food industries. Previous studies have demonstrated the presence of phytochemical compounds such as phenolic acids, flavonoids, limonoids, terpenoids and vitamin C as its major components, which can confer the development product health-related properties including effects antioxidant anticancer, anti-mutagenic, anti-allergic, anti-inflammatory, and antimicrobial (Ha et al., 2022; Zhang et al., 2022).

Consumers have been looking for foods without synthetic additives (such as dyes, flavors, etc.), low-calorie, high-fiber and with healthier properties concerned about reducing the risk of diseases such as obesity, heart disease, diabetes, and cancer (Jardim et al., 2021). The incidence of premature death, before the age of 70, as a result of neoplasms has become one of the leading public health problems in the world (Bray et al., 2021). However, one of the most used therapeutic modalities in cancer treatment is antineoplastic treatment, also known as chemotherapy. Unfortunately, this treatment is associated with side effects, such as anorexia, nausea, vomiting, constipation, diarrhea, xerostomia, sialorrhea, dysphagia, odynophagia, mucositis, dysgeusia, and dysosmia,
compromising people's quality of life globally. In addition, signs and symptoms generated after treatment can make food intake difficult and cause damage to nutritional status in response to treatment, healing, and even the quality of life of these patients (Álvaro Sanz et al., 2021).

Different nutritional strategies are used to control the various symptoms generated by chemotherapy. For example, ice cream, a food trendy among people worldwide because of its feeling of freshness, has been indicated to cancer patients to decrease the sensation of a bad taste in the mouth and relieve pain (Perera; Perera, 2021). Another alternative could be gelato, one variation of ice cream with more creaminess and less fat (Sacchi et al., 2019). Among the ice cream functionalization strategies, replacing fats and sugars and using ingredients with proven beneficial effects have been necessary for consumer demand. Therefore, this study aims to develop a sustainable gelato for cancer patients undergoing chemotherapy.

MATERIALS AND METHODS

Material

Orange (Citrus sinensis), ginger (Zingiber officinale Roscoe), 'rangpur' lime (Citrus limonia Osbeck), sweet passionfruit (Passiflora alata Curtis), chia seeds (Salvia hispanica L), isomaltulose (Palatinose), Medium-Chain Triacylglycerols (MCT), Isolated Whey Protein and Stevia were purchased locally (Maringa, Brazil). All chemicals were of analytical grade.

Preparation of Gelato

The formulation used for the gelato development contained: sweet passionfruit pulp (18.69%), 'rangpur' lime juice (18.69%), isolated whey protein (15.89%), palatinose (15.89%), ginger (9.35%), MCT (6.54%), orange peel (5.61%), chia seeds (2.34%), and water (7.01%).

First, the fresh fruits (orange, lime, and passionfruit) and the ginger were cleaned (Figure 1). Then, the orange was peeled (Fig. 1a and 1b), and the peel was submitted in syrup of stevia and water (Fig. 1c), which was boiled until the peel absorbed all the syrup
to form candied orange peel (Fig. 1d). Manually, the 'rangpur' lemons were crushed to obtain the fresh lime juice, the pulp of sweet passionfruit was removed, and the ginger was peeled (Fig. 1e). The fresh ingredients obtained (ginger, juice of 'rangpur' lime, pulp of sweet passionfruit, and water) were mixed for 1 min using a blender (Smeg, New York, USA) (Fig. 1f), followed by the slow addition of candied orange peel and MCT until complete homogenization (Fig. 1g). After this step, isolated whey protein and palatinose were added and mixed for 5 min. Then the chia seeds were added and mixed for 1 min (Fig. 1h). Subsequently, the mixture was refrigerated at 16 ± 2°C for 24 hours. In a KitchenAid ice cream maker (KIP01CX), the sample was blended for 10 min (Fig. 1i and 1j). The gelato was packaged in polyethylene closed cups and frozen at -18°C until the analysis (Fig. 1k).

**Figure 1** - Flow chart for the manufacturing of the gelato. a, b, c, and d) obtention of candied orange peel; e) ingredients used in the formulation; f, g and h) homogenization using a blender; i and j) using KitchenAid ice cream maker to aeration-freezing and k) gelato sample stored in polyethylene cups.

Source: Dutra et al. (2024).
Chemical Analysis

The moisture was determined by a gravimetric method of direct drying in an oven (Quimis, São Paulo, Brasil) at 105°C until reaching a constant weight according to AOAC method 926.12. Ash content was determined by incinerating the material in muffle (Quimis, São Paulo, Brasil) at 550°C until constant weight according to AOAC method 945.46. The protein content was estimated by Kjeldahl analysis, and total fat was determined using the Soxhlet extraction method, AOAC method 990.03. The fiber was quantified by an enzymatic-gravimetric method, AOAC method 985.29. Available carbohydrate was obtained by subtracting total fat, protein, fiber, moisture, and ash from 100%. The energy value of gelato was calculated with Atwater's conversion factor, 9 kcal/g for fat and 4 kcal/g for carbohydrates and protein (Brasil, 2003). The composition of saturated and unsaturated fatty acids was determined by gas chromatography with a flame ionization detector using an Agilent 7890B Gas Chromatograph (Agilent Technologies, Wilmington, USA). Inductively coupled plasma mass spectrometry (ICP-MS) was used to quantify the sodium (Ammann, 2007).

Total phenolic content, total flavonoid content and antioxidant activity

The extracts were prepared according to Silva et al. (2021), with modifications. In a Falcon tube, 6 g of the gelato sample were vortexed with 4 mL of 80% methanol. The tubes were placed in an ultrasonic bath at room temperature (20°C ±5) for 15 minutes and then centrifuged at 1.109xg for 15 min. The supernatant was collected, and the samples submitted at the same extraction more than two times. At the end, the supernatant was combined and stored at -20 °C + 2 °C until analyzed.

The total phenolic content, total flavonoid content and antioxidant activity by DPPH (2,2-diphenyl-1-picryl-hydrazyl-hydrate), ABTS (2,2’-azino-bis (3-ethylbenzthiazoline-6-sulfonic acid) and FRAP (ferric reducing antioxidant power) assays were performed, in eight-plicates, in 96-well microplates, and the absorbance values were measured in a Microplate Photometer (MultiSkan FC, Thermo Fisher Scientific K.K., Tokyo, Japan).

The total phenolic content of the gelato was determined using the Folin-Ciocalteu colorimetric method, described by Singleton and Rossi (1965), with some modifications.
An aliquot of 10 μL of each diluted sample was pipetted to the well with 240 μL of distilled water, 15 μL of Folin-Ciocalteau reagent, and 15 μL of sodium carbonate (Na2CO3) at 20% (m/v). The absorbance was measured at 690 nm after 60 min of the solution resting in the dark. Results were expressed as mg gallic acid equivalent (GAE)/g of gelato. The total flavonoid content was determined by an aluminum chloride colorimetric assay (Zhishen et al., 1999). A solution of 10 μL of the diluted sample was mixed well with 90 μL of sodium nitrite and left to react for 5 min. 10 μL of a 10% aluminum chloride solution was added afterwards, and the solution was left to react for another 5 min. Subsequently, 90 μL of a 1 mol/L NaOH solution was added to the well, and the absorbance was measured at a wavelength of 540 nm. The results were expressed as mg catechin equivalent (CE)/100 g of gelato.

The DPPH radical scavenging activity of the samples was determined according to the method described by Brand-Williams et al. (1995). A DPPH solution (0.12 mmol/mL) was prepared. In the well, 10 μL of the diluted sample was pipetted with 190 μL of the DPPH solution. After 30 min standing in the dark, the absorbance was measured at 540 nm. The ABTS radical scavenging activity of the samples was determined as reported by Re et al. (1999). The ABTS radical was formed by reacting 5 mL of a 7 mM ABTS+ solution with 88 μL of a 140 mM potassium persulfate solution and incubated at 25°C in the absence of light for 16 h. Then, 300 μL of ABTS and 10 μL of each sample were placed in the microplate. The absorbance was measured at 690 nm after resting 30 min in the dark. The FRAP assay, as described by Benzie and Strain (1996), was made with 100 mL of 300 mM acetate buffer at pH 3.63, 10 mL of 20 mM ferric chloride, and 10 mL of TPTZ (2,4,6-Tris(2-pyridyl)-s-triazine) previously dissolved in 40 mM hydrochloric acid. 300 μL of FRAP, and 10 μL of each sample were pipetted into each well. The absorbance was measured at 620 nm after 30 min of the solution resting in the dark. The DPPH, ABTS, and FRAP assays were expressed in mmol Trolox equivalent (TE)/g of gelato.

RESULTS AND DISCUSSION

In 2015, some strategies were created against food waste, and among the goals established by the United Nations is to ensure sustainable production and consumption standards. And according to Sustainable Development Goals (SDGs), one of the targets

...
is by 2030: “Reduce per capita global food waste at retail and consumer levels by half and reduce food losses along the production and supply chains, including post-harvest losses (Brasil, 2017). In this context, sustainable gastronomy has been used as a strategy to reduce the generation of organic waste and increase the insertion of sustainable practices throughout the process (Murta et al., 2010). With the full use of food, the parts that could be discarded, such as stalks, peels, and stems, can be used to enrich the nutritional value of culinary preparations (Carvalho and Basso, 2016).

The physical-chemical composition (sugar, protein, lipid, fatty acids, fiber, sodium, moisture, and ash) of gelato made is presented in Table 1.

### Table 1 - Physical-chemical composition of sustainable gelato.

<table>
<thead>
<tr>
<th>Nutrients</th>
<th>Per 100 g</th>
<th>%VD (*)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calories (kcal)</td>
<td>191</td>
<td>10%</td>
</tr>
<tr>
<td>Carbohydrates</td>
<td>26***</td>
<td>9%</td>
</tr>
<tr>
<td>Total sugars</td>
<td>20.42 ± 0.09**</td>
<td>41%</td>
</tr>
<tr>
<td>Proteins</td>
<td>15.49 ± 0.23**</td>
<td>31%</td>
</tr>
<tr>
<td>Total fats</td>
<td>1.52 ± 0.02**</td>
<td>2%</td>
</tr>
<tr>
<td>Saturated fatty acid</td>
<td>1.52 ± 0.02**</td>
<td>8%</td>
</tr>
<tr>
<td>Trans fats</td>
<td>0.00 ± 0.00**</td>
<td>0%</td>
</tr>
<tr>
<td>Lauric acid (C12:0) (%)</td>
<td>&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>Myristic acid (C14:0) (%)</td>
<td>&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>Palmitic acid (C16:0) (%)</td>
<td>&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>Palmitoleic acid (C16:1 cis-9)</td>
<td>&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>Stearic acid (C18:0) (%)</td>
<td>&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>Oleic acid (C18:1) (%)</td>
<td>&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>Linoleic acid (C18:2) (%)</td>
<td>&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>Linolenic acid (C18:3 cis-9, 12, 15)</td>
<td>&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>Arachidic acid (20:0) (%)</td>
<td>&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>Gadoleic acid (C20:1 cis-11)</td>
<td>&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>Behenic acid (22:0) (%)</td>
<td>&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>Erucic acid (C22:1)</td>
<td>&lt;0.01</td>
<td></td>
</tr>
</tbody>
</table>
Lignoceric acid (C24:0) <0.01
Margaric acid (C17:0) <0.01
Heptadecanoic acid (C17:1 cis-10) <0.01
Elaidic acid (C18:2 trans-9) <0.01
Linoleic acid (C18:2 trans-9, 12) <0.01
Linoleic acid (C18:3 trans-9, 12, 15) <0.01
Caprylic acid (C8:0) 61.10
Capric Acid (C10:0) 38.90
Fiber (g) 5.50 ± 0.05** 22%
Sodium (g) 7.40 ± 0.06** 0%
Moisture (g) 50.54 ± 0.56** **
Ashes (g) 0.78 ± 0.02** **

* % DV - Daily Value based on a 2,000 calorie diet or 8400 KJ.
** Means obtained from 3 repetitions.
Mean ± standard deviation: Calculated by difference: 100 – (g/100 carbohydrates + g/100 total sugars + g/100 added sugars + g/100 proteins + g/100 total fats + g+100 saturated fats + g/100 fats trans + g/100 dietary fiber + g/100 sodium + g/100 moisture + g/100 ash); The caloric value of the sample was calculated by adding the percentages of protein and carbohydrate multiplied by factor 4 (Kcal/g) added to the total fat content multiplied by factor 9 (Kcal/g).

In this study, incorporating isolated whey protein (15.89%) and orange peel (5.61%) increased gelato's protein and fiber content. As a result, the final product presented 15% protein, and 5.5% fibers, representing 31% and 22%, respectively, of the daily intake value recommended for adults. These values are higher than those obtained by Assis et al. (2018) for ice cream added grape skin and Valmorbida et al. (2019) for adapted ice cream to onco-hematological patients.

The gelato product obtained differs from other ice creams for having a reduced fat content, representing just 2% of total fat and 8% saturated fat of the daily intake value recommended for adults. The choice of the source of fat added to the gelato was based on the assumption that MCT is considered a fat that is easier to digest and absorb than long-chain fatty acids, as it has a smaller carbon chain (Law et al., 2014). In addition, the long-chain fatty acids require L-carnitine as a transporter into the mitochondrial matrix for the use of fat as an energy source. In contrast, MCT crosses the mitochondrial membrane without the aid of this transporter. Thus, MCT can be an excellent fat-source option,
assuming that cancer patients with neoplastic cachexia have a lower concentration of L-carnitine in skeletal muscle (Szefel et al., 2012).

Concerning fatty acids, the gelato presented more than 60% caprylic acid and about 39% of capric acid, coming from the MCT ingredient. In addition, the gelato also showed the presence of lauric, myristic acid, palmitic, palmitoleic, stearic, oleic, linoleic, linolenic, arachidic, gadoleic, behenic, erucic, lignoceric, margaric, heptadecanoic, elaidic, linoleic, linoleic acids in your composition.

Gelato had a total of 26% of carbohydrates similar values of Vital et al. (2018) (28%) and Valmorbida et al. (2019) (29%). In addition, every 100g of gelato provides 20g of total sugar. Palatinose used as a carbohydrate source can show advantages as a prebiotic activity by increasing the production of short-chain fatty acids (Huang; Ho, 2010; Yang et al., 2021) and a low glycemic index that helps to control the postprandial glucose profile (Suraphad et al., 2017) being able to be included as a source of carbohydrates for diabetes mellitus patients (Lightowler et al., 2019).

Comparing the proximate composition of the developed gelato with one commercial (nationwide marketed brand in Brazil developed for chemotherapy patients) ice cream, the proposed gelato formulation presented higher carbohydrate and protein, lower total fat and did not show polydextrose (Table 2).

### Table 1 - Comparison of the nutritional composition of sustainable gelato versus ice cream already marketed for patients undergoing chemotherapy.

<table>
<thead>
<tr>
<th>Nutrients</th>
<th>Gelato</th>
<th>%DV*</th>
<th>Commercial Ice Cream</th>
<th>%DV*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture (g)</td>
<td>50.54 ± 0.56</td>
<td></td>
<td>67.15 ± 0.02</td>
<td>34%</td>
</tr>
<tr>
<td>Ash (g)</td>
<td>0.78 ± 0.02</td>
<td></td>
<td>0.78 ± 0.02</td>
<td>1%</td>
</tr>
<tr>
<td>Protein (g)</td>
<td>15.49 ± 0.23</td>
<td>31%</td>
<td>11.8 ± 0.02</td>
<td>16%</td>
</tr>
<tr>
<td>Fiber (g)</td>
<td>5.50 ± 0.05</td>
<td>22%</td>
<td>7.5 ± 0.05</td>
<td>30%</td>
</tr>
<tr>
<td>Total sugar (g)</td>
<td>20.42 ± 0.09</td>
<td>41%</td>
<td>24.00 ± 0.00</td>
<td>12%</td>
</tr>
<tr>
<td>Total fat (g)</td>
<td>1.52 ± 0.02</td>
<td>2%</td>
<td>3.5 ± 0.04</td>
<td>7%</td>
</tr>
<tr>
<td>Saturated fat (g)</td>
<td>1.52 ± 0.02</td>
<td>8%</td>
<td>1.00 ± 0.00</td>
<td>5%</td>
</tr>
<tr>
<td>Trans fat (g)</td>
<td>0.00 ± 0.00</td>
<td>0%</td>
<td>0.00 ± 0.00</td>
<td>0%</td>
</tr>
<tr>
<td>Caprylic acid (C8:0) (g)</td>
<td>61.10</td>
<td></td>
<td>47.80 ± 0.00</td>
<td>24%</td>
</tr>
<tr>
<td>Capric Acid (C10:0) (g)</td>
<td>38.90</td>
<td></td>
<td>36.80 ± 0.00</td>
<td>18%</td>
</tr>
<tr>
<td>Sodium (mg)</td>
<td>7.40 ± 0.06</td>
<td>0%</td>
<td>58 ± 0.02</td>
<td>2%</td>
</tr>
<tr>
<td>Carbohydrates (g)</td>
<td>26.00</td>
<td>9%</td>
<td>23 ± 0.02</td>
<td>8%</td>
</tr>
<tr>
<td>Calories (kcal)</td>
<td>191.00</td>
<td>10%</td>
<td>178 ± 0.00</td>
<td>8%</td>
</tr>
</tbody>
</table>

* % DV - Daily Value based on a 2,000-calorie diet or 8400 kj. (n=3)
Also, adding orange peel, ginger, lemon juice, and passion fruit to gelato improved the product's functional properties compared to conventional ice cream, which is generally poor in phenolics and antioxidants (Bekkouch et al., 2022; Dos Reis et al., 2018). Finally, Table 3 shows the total phenolic, flavonoid content, and antioxidant activity of gelato elaborated in this study.

**Table 2 - Total phenolic content, total flavonoid content and antioxidant activity of sustainable gelato.**

<table>
<thead>
<tr>
<th>Analysis</th>
<th>Gelato</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total phenolics (mg EAG/g)</td>
<td>0.23 ± 0.03</td>
</tr>
<tr>
<td>Total flavonoids (mg EC/g)</td>
<td>0.10 ± 0.02</td>
</tr>
<tr>
<td>Antioxidant Activity</td>
<td></td>
</tr>
<tr>
<td>FRAP (mmol ET/g)</td>
<td>1.97 ± 0.10</td>
</tr>
<tr>
<td>DPPH (mmol ET/g)</td>
<td>0.58 ± 0.19</td>
</tr>
<tr>
<td>ABTS (mmol ET/g)</td>
<td>0.84 ± 0.23</td>
</tr>
</tbody>
</table>

The values were higher than ice cream without fruit residue or herbal extract (Gremski et al., 2019; Vital et al., 2018) and are similar to the probiotic ice cream previously developed (Akca; Akpınar, 2021).

Diverse phytochemical components, including phenolic compounds, such as hydroxycinnamic acids and flavonoids, are known to be responsible for antioxidant capacity in fruits and can be found in sweet orange peels used for the elaboration of the gelato. Among the phenolic compounds present in the sweet orange peel, the narirutin, naringin, hesperetin-7-O-rutinoside naringenin, quinic acid, hesperetin, datiscetin-3-O-rutinoside and sakuranetin stand out, which exert an anti-inflammatory function, antioxidant, antihypertensive, diuretic, analgesic and hypolipidemic (Park et al., 2014), antimicrobial, antiviral (Al-Ashaal and El-Sheltawy, 2011) and anticancer (Diab et al., 2015).

Furthermore, the ginger, lemon juice (Bekkouch et al., 2022) and passion fruit (Dos Reis et al., 2018) are rich in phenolic compounds and therefore act as antioxidants (Bekkouch et al., 2022), which contributed to the values of phenolic compounds found in this study (Table 3). A study carried out with male rats showed that the orange peel extract (Citrus sinensis), being rich in phenolic compounds with antioxidant and anti-inflammatory activity, attenuates the toxicity induced by cyclophosphamide, a chemotherapeutic drug used in the treatment of several types of cancer (Abdelghfffar et al., 2021). In addition, the study by Tajaldini et al. (2020) showed that orange peel extract
decreases side effects caused by doxorubicin in sophageal cancer stem cell xenograft tumor mouse model.

CONCLUSIONS

The gelato developed can be consumed as a strategy to increase the intake of bioactive compounds as proteins, dietary fibers and polyphenols in the general population, control chemotherapy symptoms of oncological patients, and contribute to the environment by reducing the generation of organic waste and pollution. Based on sustainable gastronomy, the orange peel gelato was successfully developed and presented protein content of high biological value, easily digested fat, low glycemic carbohydrate, phenolic and flavonoid content, and antioxidant potential. Furthermore, using the orange peel could also reduce gelato production costs by utilizing such wastes economically and improve the regular consumption of fibers that positively interferes with the gut microbiota, helping in the treatment of chemotherapy and immunotherapy. Finally, further studies are needed to identify the acceptance of these products by patients undergoing chemotherapy and evaluate the gelato's impact on the treatment's side effects.

REFERENCES


