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The history of grapefruit diet: Four solved mysteries

La historia de la dieta del pomelo: Cuatro misterios resueltos

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ABSTRACT

Introduction: Several decades ago, grapefruit diet, or 18-day diet, appeared as a hypothetic treatment to help in the weight loss being this citric fruit the key in the diet-planning program.

Objectives: This review assessed the nutrition and the history to discover when the diet appeared, who had this idea, what energetic and nutritional value and how to act in the hypothetic reduction of body weight.

Methods: A review was carried out in the PubMed, Google Scholar, and Web of Knowledge and a comprehensive search of the 'grey' literature.

Results: The reviewed information could indicate that this diet was promoted by the food and cinema industry and extended intentionally or unintentionally by Ethel Barrymore from the beginning of 1920s, being a low-calorie treatment where probably grapefruit has nothing to do with that weight loss. Furthermore, details of menu-planning were not entirely uniform and varied with the consulted literature because there is no book or pamphlet about the original diet.

Conclusions: Our review solved the mystery about grapefruit diet with a historical-nutritional viewpoint.

KEYWORDS

Grapefruit diet, 18-day diet, grapefruit, weight loss, history.

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INTRODUCTION

Nowadays, excess weight, especially obesity, is not just a major risk factor for cardiovascular disease, diabetes, high blood pressure and sleep apnoea, among others[1]; it also makes unsatisfaction with body image in patients[2]. Diets and dieting have been a constant feature in the history from Galen's manual of nutrition[3] through to recent treatments[4] being some of them called miracle diets, which could be a health risk, and even death[5]. This is the case of restricted eating (like so-called 'mono' diets where one is restricted to eating a single type of food) as the example of the consumption of grapefruit or its juice due to that have high water contents[6,7]. During the first decades of the twenty-first century, a treatment named as 'the grapefruit diet' appeared in USA being also well known as '18-day diet', 'eighteen day reducing diet' or 'Hollywood diet'. Ever since it began, four mysteries have surrounded its history including i) when did it arise? ii) who invented the diet? iii) what is its energy value? and iv) how effective is the diet?

The aim of this article is to answer these four WH-questions words (when, who, what and how questions) and to shed light closing an episode of the nutritional science using PubMed, Google Scholar, and Web of Knowledge. Furthermore, this strategy was complemented with a comprehensive search of the 'grey' literature based in four different searching strategies: i) grey literature databases, ii) customized Google search engines, iii) targeted websites, and iv) consultation with contact experts.

WHEN AND WHO

The appearance of this diet is confusing due to that some authors located in the 1920s[8], 1930s[9], 1950s[10] or 1980s[11].

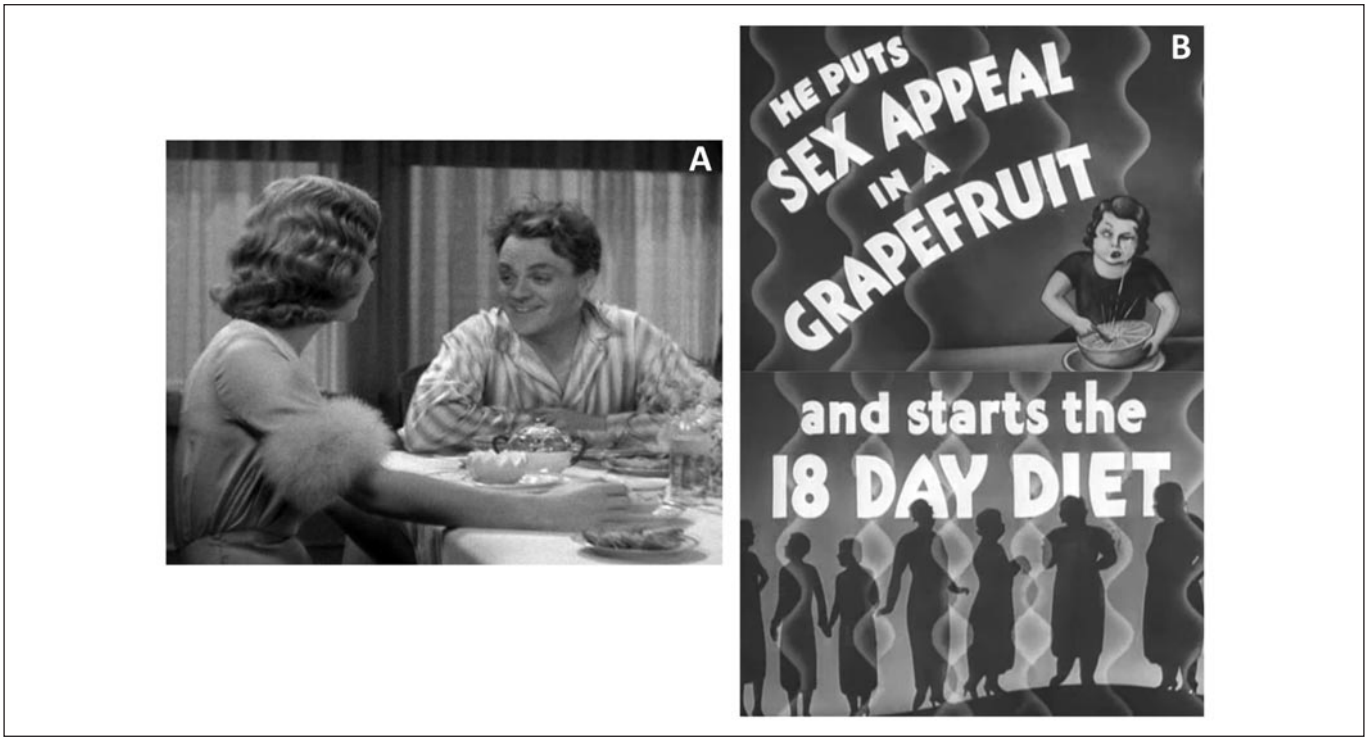
The quest for a response for this WH-question word must be seen using the reverse chronology that it has the function of revealing the plot in reverse order, that is, from the final event to the initial one. The decade of 1980s, as a starting point, is discarded due to that the diet, based on the original version, was renamed as '10-day, 10-pounds-off diet' being hypothetically focused the value of grapefruit as burning up fat[11].

We are therefore keeping the approach in the other decades, but starting of several options as are Cagney's, Toledo's LaSalle & Koch tea room, Mayo Clinic's, Barrymore's, Lynn's, Hay's and food industry connections which is relationship with the other WH-question word of this section.

Cagney's connection is called for the American actor James Francis Cagney, Jr. starred two films where use this fruit (Figure 1A). First, 'The Public Enemy' (1931) smashed a grapefruit into Mae Clarke's face, which was staged as a practical joke at the expense of the film crew, just to see their stunned reactions[12]. Director William A. Wellman, however, eventually decided to keep the shot, and use it in the film's final release print. On the other hand, second film entitled 'Hard to Handle' (1933) where he played a con man who promoted a new sensation called 'The Grapefruit Diet' reflecting as 18-day diet[13] and where drive up the prices of grapefruit (Figure 1B). In our viewpoint, the presence of this fruit, in the first film, is anecdotal being customary at breakfast hotel, but it is the thematic thread in the second film which suggested a current issue in a society that seeks strategies to lose weight and where this diet is not fictitious but established among patients who associate it with Hollywood actors and actresses and it justifies that the diet predates 1933. We have to go back to previous decade to find in relation to this diet.

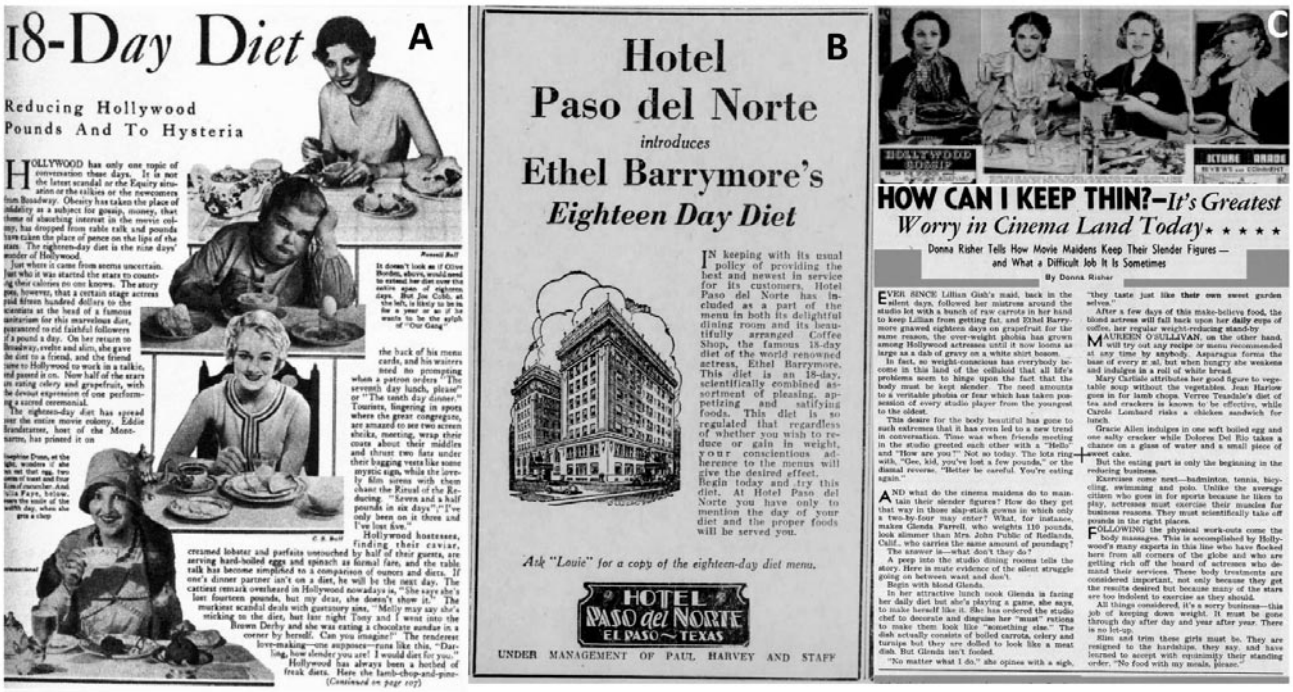
The other three connections take us back to final of 1920s, Jan Whitaker[14] indicated that 'in 1929, Toledo's LaSalle & Koch tea room offered of the eighteen-day Mayo Clinic diet of grapefruit, tomatoes, eggs, and lettuce made famous by Ethel Barrymore'. Hang on a moment, who are we talking about here? Three keys are defined by Whitaker but we should analyse it a little. First, Toledo's LaSalle & Koch tea room offered diet plates for its clients due to those dietitians worked in this establishment as a traineeship place for students from University of Toledo such is the case of Mabel Little that was dietitian and director of this tea room[15]. However, we have detected any references about of the origin of the grapefruit diet in Toledo's LaSalle & Koch tea room and in our viewpoint, the establishment offered it due to that famous at that time. This is borne out by the fact that the Hotel Paso del Norte in Paso, Texas, offered the same diet in its publicity (Figure 2A) at 1929[16]. Second key is Ethel Barrymore who was famous ac-

Figure 1. Frames of two films of actor James Francis Cagney, Jr.



(A) 'The Public Enemy' (1931); where the famous grapefruit used for the movie clip appears in the foreground12 (James Cagney smashes a grapefruit into Mae Clarke's face by astique333, https://www.youtube.com/watch?v=k4R5wZs8cxI); (B) and movie clips of the theatrical trailer 'Hard to Handle' (1933) reflecting as 18-day diet was a central idea in the film13 (Original Theatrical Trailer-Hard to Handle by Warner Archive, https://www.youtube.com/watch?v=TuQuoONEwFs).

Figure 2. FMagazine cut-outs about grapefruit diet



(A) report in the Motion Picture Magazine41 in 1929 (18-Day Diet by Anonymous, https://commons.wikimedia.org/wiki/File:18-Day_Diet.png), (B) publicity of this menu in the Hotel Paso del Norte in Paso, Texas16 in 1929 (1929--Ethel Barrymore's Eighteen Day Diet by dglsbgbsn, https://www.newspapers.com/clip/14433824/1929-ethel-barrymores-eighteen-day/) and (C) report Today San Pedro News Pilot19 in 1936 (HOW CAN I KEEP THIN? —It's Greatest Worry in Cinema hand Today by Center for Bibliographical Studies and Research, https://cdnc.ucr.edu/?a=d&d=SPNP19360125.2.181&e=-------en--20--1--txt-txIN--------1).

tress and great aunt of Drew Barrymore. In fact, she attended assiduously to this tea room[17] and the consumption of grapefruit would not be surprising to Barrymore because she had tried it at the house of Elsie de Wolfe (also known as Lady Mendl, after her marriage in 1926, who was an American actress who became a very prominent interior designer and author), who invented the Pink Lady cocktail; an unusual concoction of pink grapefruit juice, gin and Cointreau[18]. Furthermore, Donna Risher indicated that Ethel Barrymore gnawed eighteen days on grapefruit to keep from getting fat (Figure 2B)[19]. Alternatively, one rumor traces the diet to actress Ethel Barrymore, who is alleged to have paid William James Mayo and his brother 500 dollars to create a special diet for her[20]. This links directly to the third key where West-Rosenthal[21] indicated that in 1925, the Mayo Brothers (as in the Mayo Clinic we know today) prescribed the 'Eighteen Day Reducing Diet' to Barrymore. However, this is not true due that the known Mayo Clinic in Rochester steadfastly denied any association with this diet[22]. This having been said, it is quite clear that grapefruit diet was not created by Toledo's LaSalle & Koch tea room either by Mayo Clinic, and even less by Barrymore with no training in health issues, maybe if she consumed this diet, she made it famous. At least one more clue, as the fifth connection, emerged in a photo[23] recovered by Science History Images and Alamy Stock Photo and dated from 1925 reflecting Lalla Lynn, daughter of Mrs. Richard Henry Lynn[24], indicating that was one of a group who adopted the 18-day diet from a menu, strangely, made famous by Ethel Barrymore. The following previous year based in the reverse chronology is situated in 1922 where was recommended by fever patients, invalids and convalescents[25] or indicated as publicity to weight loss[26]. Surprisingly, few people know that was reflected, in 1911, a diet with a similar name (Hollywood diet), but with seventeen days of treatment and different foods, being proved (or rather scientifically cited) in rats based in the juice for reducing weight[27].

To conclude this section, the last two connections take us back to Smith's book[28] where indicated, erroneously, that this diet 'derived from Hay's work, reportedly was promoted by the grapefruit industry'. In our viewpoint, it cannot derive from William H. Hay (1866-1940) due to that his book[29] was published in 1929 and, as we have seen above, grapefruit diet was cited from four years prior. In connection with grapefruit industry, it is an exciting argument, but not the only one (even, probably, had to do cinema industry). This fruit was established, by a Spanish nobleman called Don Philippe, near Tampa (Florida, USA) in 1823 and developed with selection of

natural mutations and hybridizations[30]. But also, there is another important factor to keep in mind in this discussion which, the appearance of a new variety pink-fleshed grapefruit in Florida during 1920s to help to the growth of this food industry[31,32]. Table 1 demonstrated census and data of grapefruits during three decades[33] and taking as reference the last year cited above; 1925; it is true the increase of production of grapefruit. In fact, the U.S. Public Health Service, in 1925, had warned against the fallacies of this diet 18-day diet and it might have added that it looks much like is a goal to mass psychology in behalf of the California citrus grows[34]. But why could the film industry have also intervened? It must be found, at 1921, in a film fan magazine known as Picturegoer where endorsed a measure of Americanization[35] reflected as simplified assertion about importance to eat grapefruit[36]. We think that grapefruit diet was activated by the food and cinema industry and promoted intentionally or unintentionally by Ethel Barrymore during 1921 and 1925. It was an anonymous treatment due to that were often appointed with the name of the creator, this is the case, for instance, of Dr. Shelton's[37], Banting's[38] or Atkins[39] diets, but was reconverted as Hollywood diet due to that sounded fancy enough, as was pointed out by Yee[40].

WHAT

The main problem is that there is no book or pamphlet about the original diet being referred in menu cards, as in the case reflected and printed by Adolph 'Eddie' Brandstatter (Figure 2C)[41]; owner of Café Montmartre (or 'Brandstatter's Café Montmartre) in Hollywood[42]. Furthermore, several authors explained that this treatment is based in a low-calorie diet (500-800 calories)[43], at sometimes only 800 calories/day[44] or less than 600 calories/day[45]. Nowadays, only three references[23,41,42] reflected the typical meal plan having sizeable differences among them. We have assessed these three diets using food composition database, which help to obtain the nutritional composition of foods, typically energy, macronutrients, minerals and vitamins, from the National Nutrient Database for Standard Reference (USDA)[43]. These estimated nutritional values were compared with the first Recommended Dietary Allowances (RDAs) due to that research dietary vitamins and minerals in the 1920s and 1930s led to the publication of this reference by the Food and Nutrition Board of the National Academy of Sciences[44]. Tables 2, 3 and 4 show dietary intake of energy and macronutrients, vitamins and minerals, respectively, for the only found references, together with ancient RDAs. Energy, vitamin A and calcium intakes are lower than RDAs in the three assessed diets, but protein, thiamine, riboflavin and iron are lower than RDAs in two meal plans[23,41]. However, niacin and vitamin C are higher than RDAs in all studied examples. On the other hand, the presence of Melba toast was referred habitually in the grapefruit diet cited at the beginning 1926[45], due to that this food product was produced in Cubbison Melba Toast and Cracker Co., from this year to 1930, by Sophie Cubbison and her late husband, who baked 100% whole wheat bread[46]. Furthermore, grapefruit was suggested its consumption as one medium piece[23], a one piece and one medium piece[41] or half of a grapefruit and unsweetened grapefruit juice[42]. Table 5 reflected the median grapefruit intake in three diets[23,41,42]. Both treatments[23,41] are a very low calorie, ketogenic and a low carb and protein diets while the other is a low calorie, ketogenic and a low carb and protein diet. In our viewpoint, there is a lot of variability not only in energy and nutrients, but also in the consumed foods, including grapefruit, in the three found diets. We dare say that probably the last treatment[42] was a mistake due to that are more comparable the two initial diets[23,41] than other[42].

HOW

Nowadays, Chen and House[47] reflected one reason attributed grapefruit consumption by consumers is 'help with weight loss' (43%) being purchases usually in the summer (38%) and prefers pink/red grapefruit (73%). The treatment of weight loss has used grapefruit, its juice, as food supplement or in pill. This last was carried out, in 1980s, indicating the ecstasy of losing up to 3.6, 7.2 and 10.8 kg in 48 hours, 7 and 14 days, respectively[48], while as food supplement was reviewed by Watanabe et al.[49] indicating that dosages from 81 to 142 mg/day had a low quality of evidence in the primary impact on fat metabolism. On the other hand, only one out

Table 1. Adapted census and data of grapefruits in USA33 from 1910 to 1930

Year	Numbers of farms reporting	Numbers of trees	Quantity harvested	
			Total amount of field boxes	Total value ($)
1910	6,172	1,350,637	1,189,250	2,060,610
1920	11,431	3,073,477	3,656,437	7,176,703
1925	21,865	1,952,828	nd	nd
1930	20,598	9,236,653	8,722,429	22,731,632

nd: no data.

Table 2. Mean values of energy and macronutrients intake

Variable	Unit	Mean±SD			RDAs (44)	
		23	41	42	Female[a]	Male[b]
Energy intake	kcal	606.2±105.4	492.8±100.4	1191.9±37.5	2100	2500
Carbohydrate	g	42.4±1.8	30.9±5.3	31.6±5.6	-	-
	% energy	29.5	26.7	10.8	-	-
Protein	g	36.2±16.9	33.2±1.8	104.9±4.3	60	70
	% energy	25.2	28.7	35.8	-	-
Fat	g	28.9±5.4	22.8±7.9	69.4±0.2	-	-
	% energy	45.2	44.5	53.3	-	-
Dietary Fiber	g	11.1±1.6	8.7±0.6	10.3±0.7	-	-
SFA	g	9.1±3.0	7.7±2.2	26.5±0.1	-	-
MUFA	g	11.8±3.2	8.6±3.3	26.2±0.1	-	-
PUFA	g	3.9±0.9	3.0±1.1	7.7±0.1	-	-
PUFA/SFA	-	0.4±0.3	0.5±0.1	0.3±0.1	-	-
(PUFA+MUFA)/SFA	-	1.7±0.4	1.5±0.1	1.3±0.1	-	-
Cholesterol	mg	364.2±345.1	296.2±252.4	752.3±2.8		

Values are expressed as means ± standard deviation (SD), SFA, saturated fatty acids; MUFA, monounsaturated fatty acids; PUFA, polyunsaturated fatty acids. a Woman in sedentary work with 56 kg weight. b Man sedentary with 70 kg weight.

Table 3. Mean values of vitamins intake

Variable	Unit	Mean±SD			RDAs (44)	
		23	41	42	Female[a]	Male[b]
Vitamin A	µg	1326.9±130.1	958.4±204.3	1247.8±503.4	5000	5000
Vitamin D	µg	1.0±1.9	1.2±1.1	1.8±0.1	-	-
Vitamin C	mg	191.3±27.6	139.3±21.9	109.6±3.5	70	75
Vitamin E	mg	5.0±1.9	3.6±0.5	4.9±0.7	-	-
Vitamin B1(Thiamin)	mg	0.7±0.1	0.6±0.1	1.2±0.1	1.1	1.2
Vitamin B2(Riboflavin)	mg	0.8±0.1	0.7±0.1	1.9±0.1	1.5	1.6
Vitamin B3(Niacin)	mg	14.5±8.7	12.6±3.2	36.2±0.9	11	12
Vitamin B6(Pyridoxine)	mg	0.9±0.4	0.8±0.1	2.4±0.2	-	-
Vitamin B12(Cyanocobalamin)	µg	3.2±0.8	3.4±1.6	8.1±0.3	-	-
Folic acid	µg	208.0±42.4	150.6±53.7	204.6±5.7	-	-
Pantotenic acid	mg	3.8±0.8	3.0±1.1	7.5±0.4	-	-
Biotin	µg	23.7±27.0	16.7±13.9	492.8±100.4	-	-

Values are expressed as means ± standard deviation (SD), SFA, saturated fatty acids; MUFA, monounsaturated fatty acids; PUFA, polyunsaturated fatty acids. a Woman in sedentary work with 56 kg weight. b Man sedentary with 70 kg weight.

Table 4. Mean values of minerals intake

Variable	Unit	Mean±SD			RDAs (44)	
		23	41	42	Female[a]	Male[b]
Sodium	mg	330.3±47.4	310.2±36.0	1005.8±60.6	-	-
Potassium	mg	1624.2±280.7	1314.1±293.4	2930.4±223.9	-	-
Calcium	mg	233.7±62.9	195.6±29.7	427.6±127.0	800	800
Phosphorus	mg	502.7±89.8	444.9±66.4	1497.4±99.1	-	-
Magnesium	mg	101.4±32.7	84.9±36.2	188.9±28.5	-	-
Iron	mg	6.8±0.3	6.7±0.1	18.9±0.5	12	12
Zinc	mg	5.2±4.0	4.6±1.1	17.5±0.6	-	-
Iodine	µg	25.9±5.6	24.1±13.8	63.8±11.2	-	-
Selenium	µg	28.2±0.6	27.9±12.4	81.7±1.6	-	-
Fluoride	µg	178.7±13.4	83.0±38.9	152.2±7.0		

Values are expressed as means ± standard deviation (SD), SFA, saturated fatty acids; MUFA, monounsaturated fatty acids; PUFA, polyunsaturated fatty acids. a Woman in sedentary work with 56 kg weight. b Man sedentary with 70 kg weight.

Table 5. Intake of grapefruit/day in three studied 18-day diets[23,41,42]

		Reference 23	Reference 41	Reference 42
1st day	Breakfast	½	½	½
	Lunch	½	½	½
	Dinner	½	½	½
2nd day	Breakfast	½	½	½
	Lunch	-	-	½
	Dinner	1	½	½
3rd day	Breakfast	½	½	½
	Lunch	½	½	½
	Dinner	½	½	½
4th day	Breakfast	½	½	½
	Lunch	½	½	½
	Dinner	½	½	½
5th day	Breakfast	½	½	½
	Lunch	-	-	½
	Dinner	½	½	½
6th day	Breakfast	½	½	½
	Lunch	-	-	½
	Dinner	-	-	½
7th day	Breakfast	½	½	½
	Lunch	-	-	½
	Dinner	-	-	½
8th day	Breakfast	½	½	½
	Lunch	½	1	½
	Dinner	½	½	½
9th day	Breakfast	½	½	½
	Lunch	-	½	½
	Dinner	1	-	½
10th day	Breakfast	½	½	½
	Lunch	½	½	½
	Dinner	½	½	½

Table 5 continuación. Intake of grapefruit/day in three studied 18-day diets[23,41,42]

		Reference 23	Reference 41	Reference 42
11th day	Breakfast	½	½	½
	Lunch	½	-	½
	Dinner	½	-	½
12th day	Breakfast	½	½	½
	Lunch	-	1	½
	Dinner	½	-	½
13th day	Breakfast	½	½	½
	Lunch	-	1	½
	Dinner	-	1	½
14th day	Breakfast	½	½	½
	Lunch	½	1	½
	Dinner	-	1	½
15th day	Breakfast	½	½	½
	Lunch	½	1	½
	Dinner	½	1	½
16th day	Breakfast	½	½	½
	Lunch	-	1	½
	Dinner	1	-	½
17th day	Breakfast	½	½	½
	Lunch	½	1	½
	Dinner	½	-	½
18th day	Breakfast	½	½	½
	Lunch	½	½	½
	Dinner	½	½	½
Mean±SD		1.25±0.01	1.44±0.02	1.50±0

three references where indicating the planned menu, suggested that half of a grapefruit can be changed by 200 mL unsweetened grapefruit juice. Healthy US-Style Eating Pattern[50] at the 2000-kcal/day level indicated the consumption of one cup (237 mL) 100% fruit juice; including grapefruit. According to the aim of our manuscript, we have centred the search of bibliography in this fruit due to that the origin of '18-day diet' was based only in grapefruit and not used on any of your other food preparations. To date, two opposite review and meta-analysis[51,52], without conflicts of interest, were carried out about grapefruit and citrus, respectively. First of them concluded that evidence from randomized clinical trials (RCTs) not indicated that supplementation with this fruit generated significant reductions on body weight while the other reference, where is indicated that studies are low-quality, showed that could reduce body weight, body mass index, waist circumstance and hip circumstance compared with the control group. However, this last review was focused in citrus and/or its extracts being not applicable previous conclusions. In fact, only three articles studied this fruit. First of them, Dow et al.[53] studied the effects of daily consumption of 1.5 Rio-Red grapefruits for six weeks on body weight, but this variety[54] was introduced in 1984. The study of Fujioka et al.[55] randomized to either placebo capsules and 207 mL of apple juice, grapefruit capsules with 207 mL of apple juice, 237 mL of grapefruit juice with placebo capsule, or half of a fresh grapefruit with a placebo capsule three times a day before each meal, obtaining, after 12 weeks, a weight loss of 1.6, 1.5, 1.1 and 0.3 kg for fresh grapefruit, grapefruit juice, grapefruit capsule and the placebo groups, respectively. These results cannot be compared with '18-day diet' due to that this last treatment has a duration of two weeks and four days (versus 12 weeks), the consumption of this fruit is recommended in the meal (versus before each meal) and is intake around one piece and one quarter piece/day (versus one piece and one medium piece/day). In the last article, Silver et al.[56] researched effects of a 1/2 grapefruit, grapefruit juice and water preload consumed prior to breakfast, lunch and dinner for 12 weeks after completing a 2-week caloric restriction phase obtaining 7.1% weight loss overall, with significant decreases in percentage body, trunk, android and gynoid fat and waist circumferences but differences were not statistically significant among groups. These data indicated the consumption of a low energy dense dietary preload in a caloric restricted diet are responsible in the effective weight loss strategy rather than the consumption of grapefruit.

CONCLUSIONS

We have demonstrated that this treatment appeared in the 1920s, probably activated by the food and cinema industry. This diet included several foods being grapefruit the gold standard and which gives the name to this menu plan. However, different examples of its elaboration were vague and imprecise (i.e., not reflected the quantity of consumption of each food), not general, or even stable through time. This diet had not consensus on its definition and were lacking in its contents, being the effectiveness to weight loss more the result of its low caloric treatment than through the grapefruit.

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