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Associations between Christian Orthodox Church Fasting and Adherence to the World Cancer Research Fund's Cancer Prevention Recommendations

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Abstract: Objective: Studies regarding the health effects of religious fasting have increased in the last decade. The aim of this research was to investigate the relationship between Christian Orthodox Church (COC) fasting recommendations and cancer risk, with a specific focus on fibre, fruit, vegetables, and red and processed meat consumption. Methods: In this cross-sectional study, participants included 361 individuals from Northern Greece. One hundred and seventy-six participants followed the COC fasting regime for more than 10 years, and 185 participants did not follow any restrictive dietary patterns. Diet was assessed using a 114-item food frequency questionnaire. Results: Fasters had a more favourable dietary intake compared to non-fasters, with fasters having a higher consumption of fruit and vegetables ($p = 0.009$) and a significantly lower consumption of total processed meat ($p < 0.001$) compared to non-fasters. No significant differences were observed in the consumption of fibre and red meat consumption between the two groups. Conclusions: Following the World Cancer Research Fund Cancer Recommendations, fasters are at a potentially lowering risk of developing colorectal cancer than non-fasters due to their more favourable dietary intake. Furthermore, higher consumption of fruit and vegetables with a lower consumption of total processed meat contributes to lower the risk of metabolic syndrome. Public health strategies based on following the structured COC fasting recommendations might hopefully contribute to the prevention of metabolic syndrome and colorectal cancer.

Keywords: fasting; cancer prevention; vegetarian; plant-based; fibre; Mediterranean diet

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1. Introduction

Fasting, the voluntary abstention from prohibited foods, is a feature of many religions worldwide [1]. The Christian Orthodox Church (COC) is well known for its long and strict fasting that covers total 180–200 days annually. Fasting in the COC takes place almost every Wednesday and Friday, 40 days before Christmas, 48 days before Easter and 15 days before the Assumption, with one extra day of fasting devoted to the celebration of Apostles. During these periods, a plant-based diet is recommended, which ranges in strictness from pescatarian diets that include snails to vegan diets based on the above-mentioned religious calendar. Total abstinence from meat, dairy products, and eggs is compulsory, while the consumption of fish is strictly allowed to limited days during the fast [2].

In consideration of the fact that approximately 50–60% of the year is dedicated to COC fasting, the traditional Mediterranean diet of Greece strongly mimics those fasting dietary guidelines [2]. The Cretan Diet, as depicted in the Seven Countries Study, was itself

a reflection of those religious guidelines as per the fact that 60% of the Seven Countries Study participants declared strict adherence to the COC fasting recommendations [3–6].

According to the International Agency for Research on Cancer and the World Health Organisation (WHO) in 2020, cancer accounted for about 10 million deaths globally, with the disease being the leading cause of death worldwide [7]. Of these deaths, the WHO estimates that 30–50% of deaths are preventable through behavioural and dietary changes, with high body mass index, low fruit and vegetable intake, and lack of physical activity being some of the main contributing lifestyle factors [7].

The World Cancer Research Fund (WCRF) is a non-profit organisation that unifies a network of cancer prevention charities [8]. Reports from the WCRF are largely based on the findings of the 'Continuous Update Project' (CUP), a group of world-renowned experts on cancer and wellbeing who assess current, up-to-date literature to create the Cancer Prevention Recommendations. The WCRF published a report in 2018 called 'Diet, Nutrition, Physical Activity and Cancer: a Global Perspective' outlining recommendations to reduce the risk of developing cancer. The recommendations include maintaining a healthy weight; reducing intake of red and processed meat; keeping active; enjoying more grains, beans, fruit, and vegetables; limiting high calorie foods; limiting consumption of sugar-sweetened drinks; and limiting alcohol consumption [8]. These guidelines are closely linked to what is included in the COC fasting recommendations; therefore, research into the COC fasting diet and cancer risk is a current and interesting topic.

The data on the COC fasting regime and cancer are very limited. Therefore, this study aims to look at certain dietary habits associated with the COC fasting, with a specific focus on fibre, fruit, vegetable, and red meat intake, and compare those eating patterns to the associated WCRF 'Cancer Prevention Recommendations'.

2. Methods

2.1. Study Design and Study Population

The study took place between April and June 2018 in Thessaloniki, Northern Greece. Data collection took place one week after the end of the 48-day Easter fasting period, the longest in the COC calendar. Researchers explained the purpose of the study to eligible participants. All participants read the participant information sheet, understood the purpose of the study, provided written informed consent to participate in the study, and were free to withdraw at any time without repercussions.

2.2. Nutritional Assessment

In order to capture detailed information about all foods and beverages consumed during the study week, two interviewer-administered 24 h diet recalls were collected. One 24 h recall was collected on the day of the appointment and a second recall was scheduled for 2–3 days later and carried out via telephone. As fasting takes place every Wednesday and Friday even during non-fasting periods, Thursdays and Saturdays were not used for the 24 h recalls of fasters. All days were used for the 24 h recalls of non-fasters.

A validated food frequency questionnaire (FFQ) was used to estimate frequency of consumption of 114 different foods and beverages in a month [9]. Participants could select one of six categories that reported monthly consumption of food and beverages: never, once to three times per month, once to twice per week, three to six times per week, once per day and equal or more than two times per day. The FFQ was answered with the supervision of a trained dietitian. The accuracy of portion sizes was assisted by the use of a validated food atlas with food portion sizes photographed in plates [10], and also the use of food replicas and models, as well as household measures, such as cups and plates. Data from the 24 h recalls and the FFQ were analysed using the Food Processor nutrition analysis software (version 11.7, ESHA Research, Oak Brook, IL, USA) in which Greek recipes from the Greek food composition tables were added.

2.3. Data Preparation

Our aim was to establish if fasters better adhere to the WCRF cancer prevention guidelines, with a specific focus on fibre, fruit, vegetables, and red and processed meat consumption. For the purpose of analysis, dietary data were recoded into food groups.

Total dietary fibre intake was recoded into two variables, less than 30 g a day and more than or equal to 30 g per day. This was in line with the current dietary recommendations of 30 g fibre/day [11]. Dietary fibre intake was assessed through the analysis of the dietary recall questionnaires. Of the 361 participants, 3 participants were removed from the statistical analysis between fasting status and fibre intake due to improbable data, of more than 100 g fibre/day.

Data from the food frequency questionnaire was used to analyse fruit and vegetable intake. Foods included in the fruit and vegetable variable were boiled vegetables, fresh vegetables, citrus fruit, other fruits, and canned fruits. Pickled vegetables, dried fruit, and fruit juices were excluded, as per WCRF guidelines stating they should be 'relatively unprocessed foods' [8].

Data from the food frequency questionnaire was used to investigate red meat consumption and processed meat consumption. Total red meat included pork, beef, lamb/goat, and rabbit, while chicken, turkey, processed meats, fish, and seafood were excluded from this analysis. As aforementioned, this is in line with the WCRF classification of 'red meat' [8]. In the last food group for the analysis, total processed meat included pork sausages, turkey sausages, and canned pork.

2.4. Statistical Analysis

Statistical analysis was performed with the SPSS version 26 software (SPSS, Chicago, IL, USA). Continuous data are shown as means with standard deviations (SD) and categorical variables as relative frequencies with percentages. The Chi squared test was used to test for differences among categorical variables, while the Student *t*-test and One Way Analysis of Variance (ANOVA) were used to test for differences in continuous variables among two or more groups, respectively. Findings were classed as statistically significant if the p value was less than 0.05. If the assumptions were violated, likelihood ratio was used.

3. Results

A total of 361 participants were included in the analysis, 169 men and 192 women aged 20 to 76 years (mean age 48.5 $\pm$ 13.7 years). One hundred and seventy-six individuals (82 men and 94 women), mean age 51.9 $\pm$ 13.4 years, fasted regularly according to COC fasting regime, since their childhood or for at least the last 10 consecutive years (fasters). Another group of 185 individuals (87 men and 98 women), mean age 45.3 $\pm$ 13.3 years, were control subjects that did not fast or follow any other restrictive dietary pattern (non-fasters) (Table 1).

As seen in Table 2, there was no significant difference in average fibre intake between fasters and non-fasters (22.7 g vs. 18.3 g, respectively, $p = 0.094$). Of all participants, 82% had fibre intakes of less than 30 g a day, with no differences seen between fasters and non-fasters. Figure 1 shows that, of the small minority that met or exceeded 30 g a day, the fasting group had a slightly higher intake, with 21% of fasters consuming 30 g or more a day compared to 14% of non-fasters. Pearson's Chi square test of independence showed a weak association between fibre intake and fasting status and failed to achieve significance (Chi squared 2.8, $p = 0.094$).

Table 1. Demographic parameters of the two groups.

Variable	Fasters (*N* = 176)		Non-Fasters (*N* = 185)		
	Mean	**Std. Deviation**	**Mean**	**Std. Deviation**	***p*-Value**
Age (years)	51.9	13.4	45.3	13.3	0.000
Sex	N	%	N	%	
Male	82	46.6	87	47	0.934
Female	94	53.4	98	53	
Education level					0.010
None	2	1.1	-	-	
Primary education	10	5.7	2	1.1	
Middle education	4	2.3	5	2.7	
Secondary education	44	25.0	37	20	
Tertiary education	85	48.3	88	47.6	
Master's/Doctoral	29	16.5	53	28.6	
Missing value	2	1.1	-	-	
Marital status					0.119
Single	2	1.1	-	-	
Married/Living together	10	5.7	2	1.1	
Divorced	4	2.3	5	2.7	
Widowed	44	25.0	37	20	
Smoking status					0.000
Yes	12	6.8	61	33	
No—never	144	81.8	104	56.2	
No—quit smoking	20	11.4	20	10.8	
Alcohol status					0.000
Yes	74	42.0	134	72.4	
No	102	58.0	51	27.6	

Table 2. Dietary fibre intake.

Variable	Frequency	%	Mean (g)	Range (g)	Chi Square Value	Significance (*p* Value)
Fasters	176	49	22.7	4.4–95.8	-	-
<30 g/day	139	79	17.9	4.4–29.9	-	-
≥30 g/day	37	21	40.6	30–95.8	-	-
Non-fasters	182	51	21.8	4–81.6	-	-
<30 g/day	156	86	18.3	4–29.6	-	-
≥30 g/day	26	14	43	30.8–81.6	-	-
Total	358	100	22.3	4–95.8	2.801	0.094
<30 g/day	295	82	18	4–29.9	-	-
≥30 g/day	63	18	42	30–95.8	-	-

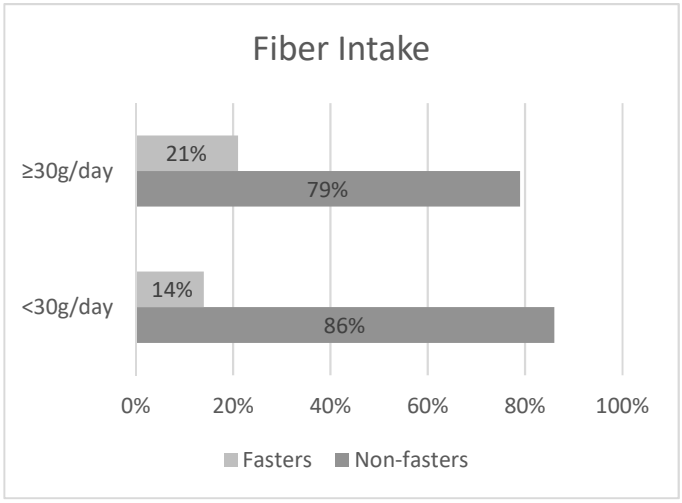

Figure 1. Bar chart for fibre consumption between fasters and non-fasters.

The bar chart in Figure 2 shows that majority of participants (58%) had a 'good' consumption of fruit and vegetables, managing to consume approximately four or more portions of fruits and vegetables a day, compared to a lower percentage of non-fasters (42%). In addition, 21% of non-fasters consumed less than two portions of fruit and vegetables a day, compared to nine percent of fasters, showing that non-fasters have a poorer fruit and vegetable intake.

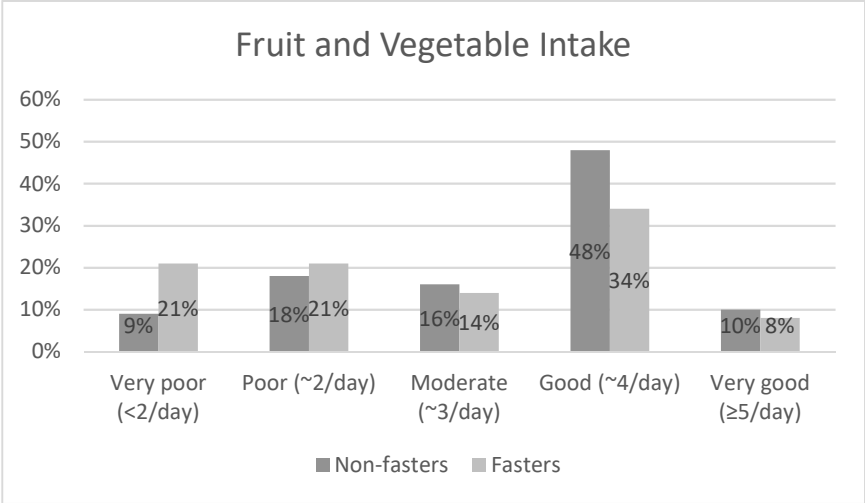

Figure 2. Bar chart for fruit and vegetable consumption between fasters and non-fasters.

Pearson's Chi square of independence test was carried out to determine the relationship between fruit and vegetable consumption and fasting status. As seen in Table 3, there was a significant association between fasting status and fruit and vegetables consumption, with fasters more likely to consume fruit and vegetables than non-fasters (p = 0.009).

Table 3. Fruit and vegetable intake.

Variable		<2/Day Value Freq. (%)	~2/Day Value Freq. (%)	~3/Day Value Freq. (%)	~4/Day Value Freq. (%)	~5/Day Value Freq. (%)	Chi Square Value	Significance (p Value)
Total fruit and vegetable intake	Fasters	16 (9.1)	31 (17.6)	28 (15.9)	84 (47.7)	17 (9.7)	-	-
	Non-fasters	38 (20.5)	39 (21.1)	32 (17.3)	62 (33.5)	14 (7.6)	-	-
	Total	54 (15)	70 (19)	60 (17)	146 (40)	31 (9)	13.5	0.009

As seen in Figure 3, the majority of both fasters and non-fasters had a high intake of red meat with 63% of fasters consuming more than two portions a week compared to 67% of non-fasters. When comparing fasting status, both fasters and non-fasters show a similar trend of increasing numbers of participants as consumption of red meat increases. Very few participants consumed a low intake of red meat, with 9% of fasters consuming red meat less than four times a month compared to 10% of non-fasters.

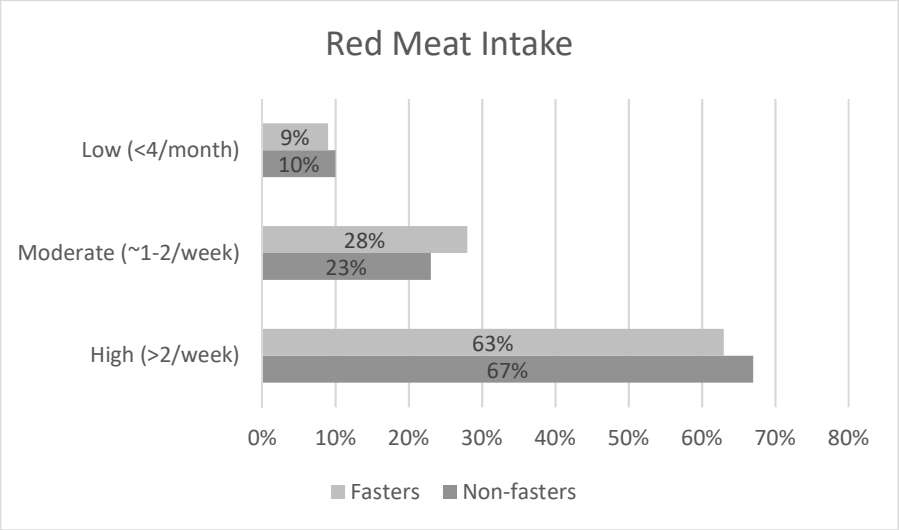

Figure 3. Bar chart for total red meat consumption between fasters and non-fasters.

Table 4 shows the breakdown of each red meat product; beef was consumed the most frequently, followed by pork. No significant associations were found between fasting status and total red meat (Chi squared 1.04, $p = 0.594$), or pork and beef ($p > 0.05$). A significant association was found between fasting status and lamb/goat (Chi squared 4.337, $p = 0.037$), however in both fasters and non-fasters overall consumption was low.

Table 4. Results for red meat intake.

	Variable	Low (<4/Month) Freq. (%)	Moderate (~1–2/Week) Freq. (%)	High (>2/Week) Freq. (%)	Chi Square Value	Sig. (*p* Value)
Total red meat	Fasters	16 (9.1)	49 (27.8)	111 (63.1)	-	-
	Non-fasters	19 (10.3)	43 (23.2)	123 (66.5)	-	-
	Total	35 (9.7)	92 (25.5)	234 (64.8)	1.04	0.594
Pork	Fasters	96 (54.5)	76 (43.2)	4 (2.3)	-	-
	Non-fasters	87 (47)	86 (46.5)	12 (6.5)	-	-
	Total	183 (50.7)	162 (44.9)	16 (4.4)	4.839	0.089
Beef	Fasters	62 (35.2)	104 (59.1)	10 (5.7)	-	-
	Non-fasters	74 (40)	92 (49.7)	19 (10.3)	-	-
	Total	136 (37.7)	196 (54.3)	29 (8)	4.365	0.113
Lamb/goat	Fasters	173 (98.3)	3 (1.7)	0 (0)	-	-
	Non-fasters	185 (100)	0 (0)	0 (0)	-	-
	Total	358 (99.2)	3 (0.8)	0 (0)	4.337 *	0.037 *

* The assumption was violated therefore, likelihood ratio was used.

It can be seen from Figure 4 that fasters had a much lower processed meat intake compared to non-fasters. Table 5 shows the breakdown of each processed meat product;

the majority of fasters (53%) had a low consumption of total processed meat compared to 27% of non-fasters. Additionally, 40% of non-fasters consumed processed meat more than two times per week compared to only 12% of fasters. Pearson's Chi squared test showed a significant association between total processed meat consumption and fasting status ($p < 0.001$). This is of great importance, as it is shown that during a non COC fasting period, fasters still consumed lower portions of processed meat compared to non-fasters. Turkey sausage was the most popular type of processed meat, with 31% of total participants consuming more than two servings of turkey sausages a week. Pork sausage, turkey sausage, and canned pork were also analysed using Pearson's Chi square test of independence. There was a significant association found between pork sausage and fasting status (Chi squared 30.830, $p < 0.001$). There was also a significant association between turkey sausage and fasting status (Chi squared 24.875, $p < 0.001$). There was no correlation found between canned pork and fasting status (Chi squared 1340, $p = 0.247$) however, all participants except one consumed canned pork less than four times a month.

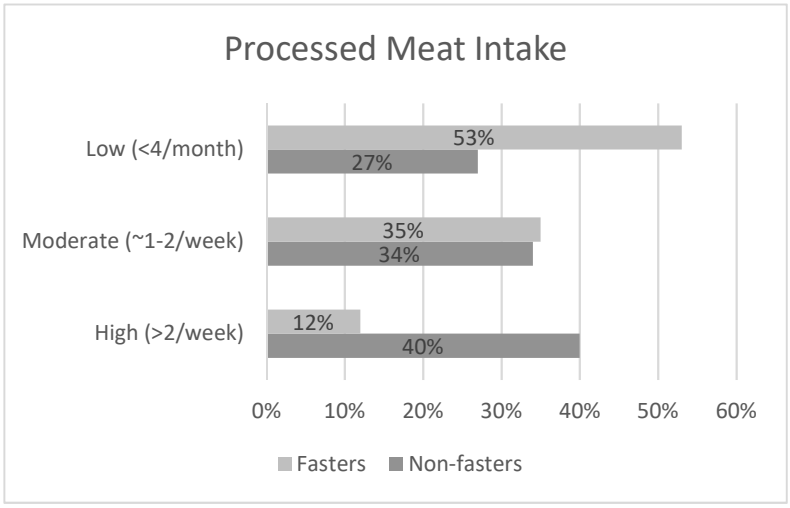

Figure 4. Bar chart for total processed meat intake between fasters and non-fasters.

Table 5. Results for processed meat intake.

	Variable	Low (<4/Month) Freq. (%)	Moderate (~1–2/Week) Freq. (%)	High (>2/Week) Freq. (%)	Chi Square Value	Sig. (*p* Value)
Total processed meat	Fasters	94 (53.4)	61 (34.7)	21 (11.9)	-	-
	Non-fasters	49 (26.5)	62 (33.5)	74 (40)	-	-
	Total	143 (39.6)	123 (34.1)	95 (26.3)	43.540	0.000
Pork sausage	Fasters	150 (85.2)	11 (6.3)	15 (8.5)	-	-
	Non-fasters	109 (58.9)	34 (18.4)	42 (22.7)	-	-
	Total	259 (63)	45 (10.9)	57 (13.9)	30.830	0.000
Turkey sausage	Fasters	106 (60.2)	30 (17)	40 (22.7)	-	-
	Non-fasters	63 (34.1)	50 (27)	72 (38.0)	-	-
	Total	169 (41.1)	80 (19.5)	112 (27.3)	24.875	0.000
Canned pork	Fasters	176 (100)	0(0)	0 (0)	-	-
	Non-fasters	184 (99.5)	1 (0.5)	0 (0)	-	-
	Total	360 (99.7)	1 (0.3)	0 (0)	1.340 *	0.247 *

* The assumption was violated therefore, likelihood ratio was used.

4. Discussion

There is limited research on the COC fasting habits, with many researchers stating that dietary patterns of COC fasters are similar to the well know Cretan diet [2]. This study aimed to assess the impact of fasting status on dietary habits, in order to establish who better adheres to the WCRF guidelines, fasters or non-fasters. From the dietary element, we know that during COC fasting periods, fasters have a higher fruit, vegetable, and fibre consumption and a lower red and processed meat consumption compared to those who do not fast [2]. Similar findings were observed in this study, even for fasters during the non-fasting period, with fasters consuming more fibre, fruit, and vegetables, less red meat, and less processed meat than non-fasters.

It is well known that fruit, vegetables, and whole grains are good sources of fibre [11]. According to a study by Sarri and colleagues, sixty COC fasters had higher intakes of dietary fibre during all fasting periods when compared to a group of sixty non-fasters [12,13]. Similar to that study, we showed that during a non-fasting period, fasters had a higher fibre consumption compared to non-fasters, with 21% of fasters and 14% of non-fasters managing to consume 30 g or more a day. However, even though the fasters had a higher fibre consumption than controls, similarly to this study, the average fibre intake for fasters was below the recommended 30 g/day. This may indicate that, even though fasters are consuming more fibre, 30 g/day may be a difficult goal to reach. Most of the countries recommend a daily intake of 25–30 g/day of dietary fibre, however approximately most adults consume fibre in less than 20 g per day [11]. Results from the ATTICA study in Greece with 3042 adults, as reported in the publication of Arvaniti and colleagues, showed that dietary fibre might be lower than 20–30 g per day [14]. A recent study by Chatzivagia and colleagues, showed that 499 Greeks showed a consumption of 27.37 g per day, while 545 matched subjects from deprived areas revealed that average fibre intake was 25.27 g per day [15].

Fruit and vegetable intake was also investigated in this study to establish if the low fibre intake correlated with a low fruit and vegetables intake. When looking at the results for fruit and vegetables, only 9% of the total participants managed to meet the recommended fruit and vegetable consumption of five-a-day, which could explain why total fibre consumption was so low in overall participants. However, when comparing fasting status, fasters had a higher consumption of fruit and vegetables compared to non-fasters. There was a significant association found between fasting status and fruit and vegetable consumption (p = 0.009). Kokkinopoulou et al. showed that during a non-fasting period fasters followed a "COC fasting" dietary pattern, explaining the first component defined by principal component analysis (PCA), and was characterised by high consumption of vegetables and fruits, among others. On the other hand, non-fasters followed a "Traditional diet", explaining the second component defined by the PCA, and was characterised by a high consumption of fruits and vegetables. The aforementioned strengthens the results of this study, revealing that COC fasters consume vegetables and fruits in higher amounts when compared to non-fasters during a non-fasting period [16].

A low fibre intake has been proven to increase the risk of developing colorectal cancer [8]. The WCRF also state that fibre has a protective effect against weight gain and obesity which are high risk factors for developing cancer. Therefore, as most participants' diets were low in fibre, this puts them at risk of weight gain and, in turn, higher risk of cancer development. In terms of this study, fasters have a higher adherence to the WCRF fibre guideline compared to non-fasters and therefore are at a lower risk of developing colorectal cancer. However, despite this, the majority of fasters did not have a diet rich in fibre and are therefore still at risk.

The association between cancer and fruit and vegetable consumption is weaker compared to the overall fibre intake; however, as a good source of fibre, fruits and vegetables are linked in the WCRF fibre recommendations. Even though the WCRF stated there was limited evidence to show a direct link between a specific cancer and fruit and vegetable consumption, the evidence collected showed a protective effect towards cancer and therefore,

the inclusion of fruit and vegetables is encouraged for overall cancer prevention. Fruit and vegetables are also rich in vitamins, minerals, and antioxidants, which have been linked with reduced cancer risk as they are required for normal cellular function in the body. A high intake of fruit and vegetables is also associated with a more nutritionally balanced diet which is advised to prevent weight gain and remain a healthy weight, which is also part of the WCRF cancer prevention guidelines to reduce overall cancer risk [8]. Therefore, a high fruit and vegetable consumption is advised in the overall prevention of cancer rather than prevention of one specific type. In relation to this study, it was shown that fasters had a higher intake fruit and vegetables than non-fasters; therefore, in terms of the WCRF guidelines, fasters might have a protective effect towards developing colorectal cancer.

Much of the research looking into meat incorporates red and processed meat together. The Scientific Advisory Committee on Nutrition (SACN) published its recommendations in terms of 'red and/or processed meat' [17,18]. In this study, the two were separated, as there is a more convincing link between colorectal cancer and processed meat than there is red meat, meaning there are slightly different recommendations for the two [8]. Red meat intake was very similar between the two groups, with high consumption being the most frequent, followed by a moderate amount (~12/week), and the minority having low amounts (<4/month). We should also take into consideration that during the period of data collection, that was exactly after the Easter fasting period, it is a traditional option to consume lamb and/or goat according to preference. As the results for each group were very similar, total red meat and fasting status failed to reach significance, although the results showed that fasters had a lower intake of red meat than non-fasters. This is of great importance, as it is shown that during a non-COC fasting period, fasters still consume lower portions of red meat compared to non-fasters. Though fasters had a lower intake of red meat, it was only by a slight margin with no significant results, and it was not possible to determine how much red meat each participant was consuming. Therefore, in light of this, it would be inappropriate to draw a conclusion on fasting status, red meat consumption, and cancer risk without more information.

Publications from Bethancourt and colleagues have revealed that, in a sample of ninety-nine fasters, there was a decreased red meat and processed meat consumption during a fasting period [19,20]. Similar to this study, we showed that, during a non-fasting period, fasters had a lower red and processed meat consumption compared to non-faster individuals. According to the Greek dietary guidelines for adults, red meat consumption should be limited to up to one serving per week and processed meat should be avoided [21]. Our study showed that 28% of fasters and 23% of non-fasters consume one serving of red meat per week, while processed meat is avoided by 53% of fasters and 27% of non-fasters during a month.

In terms of cancer risk, as per the WCRF recommendations, the recommendation is to "consume very little, if any, processed meat". There is "strong evidence that consumption of red meat and consumption of processed meat are both causes of colorectal cancer". Limited and suggestive evidence has been found between meat consumption and other cancers. This is also backed up by Chan and colleagues who conducted a meta-analysis on 21 prospective studies looking at red and processed meat intake and the association with colorectal cancer and found high intakes of red and processed meat was associated with a significantly increased risk of colorectal cancer. When red meat and processed meat were examined separately, they found both were associated with an increased risk of colorectal cancer [22]. In relation to this study, it was shown that fasters had a lower consumption of processed meat when compared to non-fasters. Therefore, in terms of the WCRF guidelines, fasters might be protected against developing colorectal cancer. Additionally, even though it was not appropriate to draw a conclusion on red meat and cancer risk, red meat was still consumed which, as stated above, is a cause of colorectal cancer and should be taken into consideration.

However, even though WCRF state there is strong evidence that the consumption of both red and processed meat cause colorectal cancer, it is advised not to remove meat from

the diet all together, as it contains vital nutrients such as iron, zinc, protein, and vitamin B12 [8,17].

There are multiple limitations to this study, including selection bias, as all subjects were volunteers, and the observational nature of this cross-sectional study. Additionally, dietary intake was based on self-reporting 24 h recall and food frequency questionnaires that might lead to under- and/or over- reporting of food intakes.

5. Conclusions

The focus of this study was to establish if there was a link between following the COC fasting recommendations, which has similarities to the Cretan diet, and cancer risk. A combination of factors portray that neither the fasters nor the non-fasters had a particularly good diet. This puts most participants in this study at risk of many health conditions, including colorectal cancer. From the results it may suggest that the fasters still had a more desirable diet compared to the non-fasters, with fasters consuming less fruit, vegetables, and fibre, and consuming more red and processed meat. This puts non-fasters at a higher risk of developing colorectal cancer compared to fasters, according to the WCRF recommendations.

Author Contributions: A.K. (Anna Kokkinopoulou) contributed to design, data collection, statistical analysis, data interpretation, and manuscript drafting. R.M. contributed to statistical analysis, data interpretation, and manuscript drafting. Y.B. contributed to statistical analysis, data interpretation, and manuscript drafting. J.A. contributed to statistical analysis, data interpretation, and manuscript drafting. I.P. contributed to design and data collection. M.H. contributed in design and data interpretation. A.K. (Anthony Kafatos) supervised the study. All authors contributed to the article. All authors have read and agreed to the published version of the manuscript.

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Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki, and approved by the Bioethics Committee of the former Alexander Technological Educational Institute of Thessaloniki, presently International Hellenic University; approval number 31.5/5679/17-12-2013.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The raw data supporting the conclusions of this study are available from the corresponding author upon request. The data are not publicly available due to security.

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Conflicts of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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