

Examination of the dietary, physical activity, and screen use habits of adults with and without a cancer diagnosis: A hospital-based case-control study

Kanser tanısı bulunan ve bulunmayan erişkin bireylerin beslenme, fizik aktivite ve ekran kullanım alışkanlıklarının araştırılması: Hastane tabanlı bir vaka-kontrol çalışması

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ABSTRACT

Introduction: This study aimed to investigate and compare the dietary, physical activity, and screen use habits of adults with and without a cancer diagnosis. **Materials and Methods:** This is a hospital-based case-control study. The study was conducted in 2019 at a university hospital in K..., Turkey. The study included 151 individuals, 49 in the case group and 102 in the control group, who met the inclusion criteria. The research data were analyzed using independent samples t-test / Mann-Whitney U-test, and Chi-squared test. Odds Ratio (OR) and Cohen's d effect size were also calculated. **Results:** After stratification by age, there was statistical significance between the case and control groups for water consumption at age ≤ 55 years and coffee consumption at age ≥ 56 years ($p < 0.05$). In addition, the effect sizes calculated for water and coffee were small/moderate. No statistical significance was found between the case and control groups for other dietary and physical activity habits, but an OR was obtained suggesting that liquid oils at room temperature were more protective than solid oils (OR=0.439; 95% CI=0.198-0.977). A statistically significant difference was found between the case and control groups for the variables of television viewing status and computer use time ($p < 0.05$). The calculated ORs were less than 1 and were protective. **Conclusion:** Variables thought to be associated with cancer were not statistically significant. The relationship between cancer and dietary, physical activity, and screen use habits, which are an integral part of daily life, is still unclear and needs to be clarified.

ÖZ

Giriş ve Amaç: Bu çalışmada kanser tanısı bulunan ve bulunmayan erişkin bireylerin beslenme, fizik aktivite ve ekran kullanım alışkanlıklarının araştırılması ve karşılaştırılması amaçlanmıştır. **Gereç ve Yöntem:** Araştırma hastane tabanlı bir vaka-kontrol çalışmasıdır. Araştırma 2019 yılında K..., Türkiye'de bir üniversite hastanesinde yapılmıştır. Araştırma kapsamına dahil etme kriterlerini karşılayan 49'u vaka grubunda ve 102'si kontrol grubunda 151 kişi alınmıştır. Araştırma verileri bağımsız gruplarda t testi/Mann-Whitney U testi, Ki-kare testi ile değerlendirilmiştir. Ayrıca Odds Ratio (OR) ve Cohen d etki büyüklüğü hesaplanmıştır. **Bulgular:** Vaka ve kontrol grupları arasında, yaşa göre tabakalandıktan sonra ≤ 55 yaşta su tüketimi ve ≥ 56 yaşta kahve tüketimi açısından istatistiksel açıdan anlamlılık vardı ($p < 0,05$). Ayrıca su ve kahve için hesaplanan etki büyüklükleri küçük/orta düzeylerdeydi. Beslenme ve fizik aktivite alışkanlıkları açısından vaka ve kontrol grupları arasında istatistiksel açıdan anlamlılık saptanmadı ancak oda sıcaklığında sıvı olan yağların katı olan yağlara göre daha koruyucu olduğu düşündürülen bir OR elde edildi (OR=0,439; %95 CI=0,198-0,977). Vaka ve kontrol grupları arasında televizyon izleme durumu ve bilgisayar kullanma süresi değişkenlerinde istatistiksel açıdan anlamlı farklılık belirlendi ($p < 0,05$). Hesaplanan OR'ler 1'den küçük olup koruyucu nitelikteydi. **Sonuç:** Kanserle ilişkili olduğu düşünülen değişkenler istatistiksel açıdan anlamlı bulunmamıştır. Günlük yaşamın ayrılmaz bir parçası olan beslenme, fizik aktivite ve ekran kullanım alışkanlıkları ile kanser arasındaki ilişki hala net değildir ve açıklığa kavuşturulması gerekmektedir.

Key Words:
Cancer, Diet, Physical Activity,
Screen Use, Etiology

Anahtar Kelimeler:
Kanser, Beslenme, Fizik Aktivite,
Ekran Kullanımı, Etiyoloji

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INTRODUCTION

Cancer is a major and leading cause of death worldwide (World Health Organization [WHO], 2020). In 2020, approximately 10 million deaths from cancer and more than 19 million newly diagnosed cases were predicted. The most common cancers that can arise in any tissue or organ, are breast, lung, colorectal, and prostate. Lung, colorectal, liver, and stomach cancers are the leading causes of cancer death (International Agency for Research on Cancer [IARC], 2020).

Genetic mutations, familial predisposition, chronic inflammation, environmental exposures, lifestyle factors, age, and hormonal factors are the major themes in the etiology of cancer (American Cancer Society [ACS], 2023). The World Health Organization (WHO) (2022) reports that lifestyle factors such as tobacco use, high body mass index, alcohol consumption, low fruit and vegetable intake, and physical inactivity are responsible for one-third of cancer deaths (WHO, 2022).

The relationship between lifestyle factors and cancer and the mechanisms of this possible relationship have been studied for years. In addition, it is possible to mention etiological factors specific to each type of cancer. For example, ultraviolet radiation is associated with skin cancer, hepatitis B and hepatitis C viruses with liver cancer, human papillomavirus with cervical cancer, BRCA-1 and BRCA-2 mutations with breast cancer, and tobacco with many types of cancer, especially lung, larynx, mouth and bladder (Mohania et al., 2017; de Martel et al., 2020; Lee et al., 2012; Bassiony et al., 2015).

When evaluating nonspecific and specific factors in the etiology of cancer, the fact that cancer is actually a change at the cellular level should not be ignored. Regardless of the type of cancer can originate from a single cell and reach invasion and metastasis (Hanahan & Weinberg, 2011; Tomasetti et al., 2017).

This study aimed to investigate and compare the dietary, physical activity, and screen use habits of adults with and without a cancer diagnosis.

MATERIALS AND METHODS

Study type and sample

This is a hospital-based case-control study. The study population consisted of patients with and without a cancer diagnosis who were admitted to a medical faculty hospital in K..., Turkey. The sample size of the study was calculated as a minimum of 144 people with a medium effect size (0.5), 5% margin of error, 95% confidence interval, 80% power, and a ratio of controls to cases of 2 for independent samples t-test using G*Power program

(Faul et al., 2009). One hundred and fifty-one people were included in the study, 49 in the case group and 102 in the control group. The study was conducted on male and female adults, aged 18 years and older.

Inclusion and exclusion criterias for cases and controls

The inclusion criteria for the case group were to have been diagnosed with cancer, to have been diagnosed within the last year, and not to have a defined genetic and/or familial cancer syndrome. The inclusion criteria for the control group were no current and/or previous cancer, no chronic disease(s) such as diabetes mellitus, chronic kidney disease, or coronary heart disease. For the study, it was planned that the case and control groups would have similar characteristics in terms of age, gender, income status, and active smoking, and that the variable(s) for which similarity could not be achieved would be assessed by the Mantel-Haenszel test or by stratification. Among the variables that should be similar in the case and control groups, a difference between the groups was found for age (Mann-Whitney $U=1077$, $p<0.001$); no difference was found for gender, income status, and active smoking ($p>0.05$). To make the control group similar to the case group in terms of the age variable, the age variable of both groups was grouped by dividing the age variable of both groups by 55, a value close to the mean and median age of the case group, in the comparisons to be made in the variables that may be related to cancer.

Study settings

For the study, a data collection form consisting of 37 questions and 2 main sections was prepared by the researchers. The first part of the form covers some sociodemographic and medical characteristics of the participants, and the second part covers the dietary, physical activity, and screen use habits of the participants. Twelve of the questions were open-ended and 32 were closed-ended. The data collection form was administered to the volunteer participants who were hospitalized between 11/01/2019 and 12/15/2019 and who agreed to participate in the study under observation. Each form took approximately 20 min to complete. Participants with a cancer diagnosis were asked to answer the questions by thinking about the last year before diagnosis, and participants without a cancer diagnosis were asked to answer the questions by thinking about the last year.

Study permissions

Ethical approval was obtained from X University X Medical Faculty Ethics Committee (dated 18.10.2019

and numbered 2019/2117). Additionally institutional approval was obtained from the chief medical officer of the hospital.

Statistical analysis

Analyses were performed using SPSS (SPSS for Windows, version 16.0. Chicago, SPSSInc.) and G*Power version 3.1.9.7. Mean±standard deviation and median (minimum-maximum) were used to summarize numerical data, and numbers and percentages were used to summarize categorical data. The assumption of normal distribution was tested using visual (histogram) and analytical (Shapiro-Wilk test) methods. Relationships between numerical data were assessed by independent samples t-test when the distribution was normal. In cases where the distribution was not normal, the Mann-Whitney U test was used. Relationships between categorical data were assessed by Chi-squared test. $p < 0.05$ was considered statistically significant. In addition to these general analyzes, effect sizes were calculated. The effect size calculated was the Odds Ratio (OR) with a 95% confidence interval (CI) for categorical variables and Cohen's d for numerical variables. In the evaluation of ORs, comments were

made on the basis of the fact that the 95% confidence interval does not include 1 and the quantification of the value obtained. For Cohen's d (t-test family), a small effect size of approximately 0.2, a medium effect size of approximately 0.5 and a large effect size of approximately 0.8 were accepted.

RESULTS

Sociodemographic characteristics of the participants

The mean age of 49 cancer patients in the case group was 54.69 ± 15.01 years and the median age was 56 (22-87) years. The mean age of 102 patients in the control group was 37.56 ± 14.73 years and the median age was 34.5 (19-70) years. The mean body mass index was 23.99 ± 3.87 kg/cm² in the case group and 26.82 ± 5.54 kg/cm² in the control group. There was no significant difference between the case and control groups in terms of gender, employment status, perceived income status, place of residence, smoking status, alcohol consumption status, and presence of chronic diseases ($p > 0.05$). The sociodemographic characteristics of the participants are shown in Table 1.

Table 1. Sociodemographic characteristics of the study participants (K..., Turkey, 2019)

| Variables | | Control Group | | Case Group | | Test Statistics | P |
|---|--------------------------------|---------------------|------|---------------------|------|-----------------|-------|
| Age (years) | (Mean±SD) | 37.56±14.73 | | 54.69±15.01 | | -5.654 | 0.001 |
| | Median (Min-Max) | 34.5 (19-70) | | 56 (22-87) | | | |
| Body-Mass Index (kg/cm ²) | (Mean±SD) | 26.82±5.54 | | 23.99±3.87 | | 3.632 | 0.002 |
| | Median (Min-Max) | 25.99 (16.65-44.54) | | 23.73 (17.21-33.33) | | | |
| Gender | Female (n%) | 63 | 61.8 | 29 | 59.2 | 0.093 | 0.761 |
| | Male (n%) | 39 | 38.2 | 20 | 40.8 | | |
| Marital status | Married (n%) | 64 | 62.7 | 42 | 85.7 | 11.166 | 0.004 |
| | Single (n%) | 34 | 33.3 | 4 | 8.2 | | |
| | Divorced/Widowed (n%) | 4 | 3.9 | 3 | 6.1 | | |
| Educational level | Middle school and below (n%) | 41 | 40.2 | 36 | 73.5 | 14.664 | 0.001 |
| | High school and above (n%) | 61 | 59.8 | 13 | 26.5 | | |
| Employment status | Working (n%) | 30 | 29.4 | 18 | 36.7 | 0.819 | 0.366 |
| | Not working (n%) | 72 | 70.6 | 31 | 63.3 | | |
| Perceived income status | Income less than expenses (n%) | 27 | 26.5 | 11 | 22.4 | 1.555 | 0.460 |
| | Income covers expenses (n%) | 61 | 59.8 | 34 | 69.4 | | |
| | Income more than expenses (n%) | 14 | 13.7 | 4 | 8.2 | | |
| Place of residence | Province (n%) | 68 | 66.7 | 26 | 53.1 | 5.172 | 0.075 |
| | District (n%) | 27 | 26.5 | 14 | 28.6 | | |
| | Village/Town (n%) | 7 | 6.9 | 9 | 18.4 | | |
| Smoking status | Yes (n%) | 36 | 35.3 | 23 | 46.9 | 1.885 | 0.170 |
| | No (n%) | 66 | 64.7 | 26 | 53.1 | | |
| Presence of smokers in the same residence | Yes (n%) | 39 | 38.2 | 29 | 59.2 | 5.868 | 0.015 |
| | No (n%) | 63 | 61.8 | 20 | 40.8 | | |
| Alcohol consumption status | Yes (n%) | 15 | 14.7 | 10 | 20.4 | 0.779 | 0.377 |
| | No (n%) | 87 | 85.3 | 39 | 79.6 | | |
| Presence of chronic disease | Yes (n%) | 9 | 8.8 | 8 | 16.3 | 1.865 | 0.172 |
| | No (n%) | 93 | 91.2 | 41 | 83.7 | | |

Of the 49 patients in the case group, 14 had colon ca, 8 had gastric ca, 8 had breast ca, 5 had leukemia, 4 had ovarian ca, 3 had prostate ca, 2 had lymphoma, 2 had laryngeal ca, 1 had endometrial ca, 1 had cervix ca, and 1 had bladder ca.

Dietary habits of the participants

Forty-two (85.7%) of the case group and 85 (83.3%) of the control group consumed iodized salt. Red meat consumption was frequent (4-5 times per week) in 39 (79.6%) of the case group and 87 (85.3%) of the control group. Forty-four (89.8%) of the case group and 95 (93.1%) of the control group consumed fruit and vegetables every day. Thirty (61.2%) of the case group and 81 (79.4%) of the control group commonly used oils that were liquid at room temperature. Thirty-nine (79.6%) of the case group and 65 (63.7%) of the control group consumed fast food less than once a week. Twenty-nine (59.2%) of the case group and 63 (61.8%) of the control group consumed junk food 4-5 times a week. Forty-five (91.8%) of the case group and 94 (92.2%) of the control group consumed fiber every day.

After stratification by age, there was statistical significance between the case and control groups for water consumption at age ≤ 55 years and coffee consumption at age ≥ 56 years ($p < 0.05$). In addition, the effect sizes calculated for water and coffee were small/moderate. The amounts of water, tea, and coffee consumed by the case and control groups and comparisons between groups are shown in Table 2.

Based on the Mantel-Haenszel test performed with stratification by age, no statistical significance was found between the case and control groups in terms of dietary habits. However, although not statistically significant, an OR was obtained suggesting that liquid oils at

room temperature were more protective than solid oils (OR=0.439; 95% CI=0.198-0.977; $p=0.071$). The details of the analyzes are shown in Supplementary Table 1.

Physical activity habits of the participants

Twenty-two (44.9%) participants in the case group exercised regularly for at least half an hour at least three days a week. This rate was higher than in the control group. The control group (58.8%) preferred walking/cycling, which was most common when traveling to and from places. In the case group, 29 people (59.2%) preferred to use stairs instead of lifts/walking stairs in daily life. Thirty-seven (75.5%) of the case group and 70 (68.6%) of the control group were exposed to direct sunlight for 15-20 min a day.

The characteristics of the participants related to physical activity are shown in Table 3.

Based on the Mantel-Haenszel test performed with stratification by age, no statistical significance was found between the case and control groups. The details of these analyzes are presented in Supplementary Table 1.

Screen use habits of the participants

Forty-eight (98%) participants in the case group and 83 (81.4%) participants in the control group were viewing television (TV). Forty-six (93.9%) participants in the case group and 100 (98%) in the control group were using mobile phones. Twelve (27.3%) participants in the case group and 39 (39.8%) in the control group were using computers. In the case group, the mean daily TV viewing time was 203.54 ± 155.12 and the median was 180 (30-720) min. In the control group, the mean TV viewing time was 151.70 ± 126.94 and the median was 120 (10-600) min (Table 4).

Table 2. Water, tea, and coffee consumption habits of the study participants (K..., Turkey, 2019)

| Age groups | | Control Group | | | | | Case Group | | | | | Test statistic | P | Cohen d |
|------------|--------------------------------|---------------|------|--------|------|-------|------------|------|--------|------|-------|----------------|--------|---------|
| | | Mean | SD | Median | Min | Max | Mean | SD | Median | Min | Max | | | |
| ≤ 55 | Water consumption (litres/day) | 1.86 | 1.04 | 2.00 | 0.30 | 6.00 | 1.40 | 0.63 | 1.35 | 0.50 | 3.00 | -2.097 | 0.036* | 0.47 |
| ≥ 56 | Water consumption (litres/day) | 1.45 | 0.74 | 1.40 | 0.50 | 3.00 | 1.46 | 0.72 | 1.50 | 0.20 | 3.00 | -0.371 | 0.711 | 0.62 |
| ≤ 55 | Tea consumption (cups/day) | 5.66 | 5.23 | 4.00 | 0.00 | 30.00 | 5.42 | 5.94 | 4.50 | 0.00 | 30.00 | -0.286 | 0.775 | 0.04 |
| ≥ 56 | Tea consumption (cups/day) | 5.79 | 5.05 | 4.00 | 0.00 | 15.00 | 5.44 | 6.14 | 3.00 | 0.00 | 25.00 | -0.488 | 0.625 | 0.06 |
| ≤ 55 | Coffee consumption (cups/day) | 1.05 | 1.51 | 1.00 | 0.00 | 10.00 | 0.67 | 0.76 | 0.50 | 0.00 | 2.00 | -0.818 | 0.413 | 0.28 |
| ≥ 56 | Coffee consumption (cups/day) | 0.79 | 0.98 | 1.00 | 0.00 | 4.00 | 0.28 | 0.54 | 0.00 | 0.00 | 2.00 | -2.249 | 0.024* | 0.67 |

* $p < 0.05$

Table 3. Physical activity-related characteristics of the study participants (K..., Turkey,

| | | Control Group | | Case Group | |
|---|---------------------|---------------|------|------------|------|
| | | n | % | n | % |
| Exercising regularly at least three days a week for at least half an hour | Yes | 43 | 42.2 | 22 | 44.9 |
| | No | 59 | 57.8 | 27 | 55.1 |
| Commonly used method of traveling to and from a place | Walking/cycling | 60 | 58.8 | 25 | 51.0 |
| | Vehicle motorised | 42 | 41.2 | 24 | 49.0 |
| Commonly used method in daily life | Stairs | 50 | 49.0 | 29 | 59.2 |
| | Lift/walking stairs | 52 | 51.0 | 20 | 40.8 |
| 15-20 min of daily exposure to direct sunlight | Yes | 70 | 68.6 | 37 | 75.5 |
| | No | 32 | 31.4 | 12 | 24.5 |

Table 4. Screen use time of the study participants* (K..., Turkey, 2019)

| | | Mean | Standard Deviation | Median | Minimum | Maximum |
|---------------|-----------------------------------|--------|--------------------|--------|---------|---------|
| Control group | Daily TV viewing time (min) | 151.70 | 126.94 | 120.00 | 10.00 | 600.00 |
| | Daily mobile phone use time (min) | 44.85 | 38.39 | 30.00 | 5.00 | 180.00 |
| | Daily computer use time (min) | 138.97 | 92.87 | 120.00 | 30.00 | 420.00 |
| Case group | Daily TV viewing time (min) | 203.54 | 155.12 | 180.00 | 30.00 | 720.00 |
| | Daily mobile phone use time (min) | 51.48 | 44.50 | 30.00 | 5.00 | 180.00 |
| | Daily computer use time (min) | 58.75 | 40.68 | 60.00 | 30.00 | 180.00 |

*Time was calculated for the participants who stated that they watch television and use mobile phones/computers

After grouping the time of TV viewing and mobile phone/computer use according to the median of the case group, the Mantel-Haenszel test was performed with stratification by age. Accordingly, a statistically significant difference was found between the case and control groups for the variables TV viewing status (caused by those who viewed) and computer use time (caused by those who used more than 60 min) ($p < 0.05$). The calculated ORs were less than 1 and were protective (Supplementary Table 1).

DISCUSSION

In this study, higher water consumption in the control group at age ≤ 55 years and higher coffee consumption in the control group at age ≥ 56 years were found to be statistically significant. In addition, Cohen's d effect sizes calculated for water and coffee were interpreted as small/medium. Although no statistically significant difference was found, an OR value was obtained suggesting that using liquid oils at room temperature may be more protective than using solid oils. These are the only dietary variables that the study could identify between the groups with and without a cancer diagnosis. For variables that are thought to be more closely related to cancer, such as red meat, fruit and vegetables, and fast food, no difference was found. Although the mechanisms underlying the relationship between diet and cancer are not fully understood, several mechanisms have been mentioned, including hormonal, metabolic,

immune/inflammatory, epigenetic, and gut microbiota (Mittelman, 2020; Teegarden et al., 2012; Sánchez-Alcoholado et al., 2020). A study evaluating data from 415,589 individuals found that the risk of upper gastrointestinal cancer decreased with increasing healthy diet scores, and this decrease was 24% at very high scores (Liu et al., 2023). A systematic review including 12 studies examined the relationship between adherence to the Cancer Prevention Guidelines for Diet and Physical Activity and overall cancer incidence and mortality and concluded that adherence resulted in a reduction in both incidence and mortality (Kohler et al., 2016). In the Dutch European Prospective Investigation into Cancer and Nutrition cohort, in which a total of 35,355 women and men were followed for an average of 12.7 years, a healthy eating index was calculated on the basis of WHO guidelines. No association was found between this score and overall cancer incidence (Berentzen et al., 2013). In a systematic review of 64 studies that examined the relationship between dietary quality scores and cancer risk and mortality in adults, no association was found. In fact, an inverse association was found between diet quality scores and the risk of postmenopausal breast, colorectal, and head and neck cancers (Potter et al., 2016). In the literature, some studies find an association between diet and cancer, whereas others do not find or cannot find a significant association, as in the current study. It can be said that the many unknown equations between diet and cancer have not been solved, and the available evidence needs to be evaluated sensitively.

In this study, variables related to physical activity were not different between the groups with and without cancer diagnosis. In addition, when considering ORs as the effect size as well as p-values, no protective or risk-increasing value was reached that did not include a confidence interval of 1. In the literature, hormone levels, metabolic markers, immune/inflammatory effects, and reduction in overweight/obesity can be listed as possible mechanisms of the relationship between physical activity and cancer (McTiernan, 2008; Friedenreich & Orenstein, 2002; Friedenreich et al., 2017). In a systematic review of 18 articles that examined the relationship between physical activity and cancer, 10 found a positive association between physical activity and cancer. However, no association was found in 8 studies (Lynch, 2010). A systematic review conducted to provide the scientific basis for Canada's Physical Activity Guide for Healthy Active Living for Adults, which examined the relationship between levels of physical activity and premature death and seven chronic diseases, including cancer, found that the incidence of breast and colorectal cancer decreased with increasing levels of physical activity (Warburton et al., 2010). A case-control study investigating the association between physical activity and ovarian cancer found that moderate recreational and regular physical activity may reduce ovarian cancer, but no similar association was found for vigorous physical activity. The same study also found that vigorous physical activity was associated with an increase in some histological types of ovarian cancer (Pan et al., 2005). A systematic review of 12 studies found that adherence to the Cancer Prevention Guidelines for Diet and Physical Activity was associated with a reduction in overall cancer incidence and mortality (Kohler et al., 2016). An umbrella review investigating the relationship between physical activity and cancer found strong evidence that physical activity can reduce colorectal and breast cancer, whereas the evidence for other cancer types is less conclusive (Rezende et al., 2018). A systematic review of 45 reports found strong evidence of an association between the highest and lowest levels of physical activity and reduced risk of bladder, breast, colorectal, endometrial, oesophageal adenocarcinoma, kidney, and stomach cancers. The same systematic review stated that more research is needed to determine the association between physical activity and the incidence of less common cancers and survival for other cancers (McTiernan et al., 2019). A meta-analysis of 10 prospective cohorts found that increased physical activity reduces liver cancer (Lee, 2020). In the cohort of postmenopausal women studied in the Women's Health Initiative Observational Study (WHI-OS) and Clinical Trial (WHI-CT), followed for an average of 11.8 years, physical activity was found to have a reducing effect

on lung cancer incidence and mortality, particularly in nonobese women (Wang et al., 2016). Although there are publications in the literature that are inconclusive about the relationship between physical activity and cancer, similar to our study, there are more publications that find that physical activity reduces the risk of cancer. Of course, this may indicate a real association. However, publication bias, a type of bias that can be defined as the publication of more studies that find a significant association, should also be considered when interpreting these results. The place where the studies were conducted and the individual characteristics of the study participants may be another reason for similar and different study results in the literature.

In our study, TV viewing status and computer use time were found to be statistically significant in the group with and without a cancer diagnosis. In addition, although the OR values calculated for these two variables are very close to zero, the confidence intervals do not include 1 and are protective. In other words, according to these results, TV viewing and using a computer for more than 60 min may be protective against cancer. However, we have no hypothesis or basis for the possible reasons for this situation. In a study by Hunter and colleagues, increased daily screen time, especially TV viewing, was associated with a small increase in cancer risk (Hunter et al., 2020). In the literature, the relationship between screen use and cancer has been established at several points. Prolonged screen time can lead to physical inactivity and a sedentary lifestyle (Biddle et al., 2017). During screen time, consumption of high-calorie, low-nutrient foods and sugary beverages may increase and individuals may develop unhealthy eating habits (Rocka et al., 2022; Tambalis et al., 2020). Insomnia/changes in sleep patterns that may occur due to blue light exposure, particularly from screen use before sleep, affect melatonin hormone levels (Hale & Guan, 2015). In the long term, sleep problems have been linked to cancer (Irwin et al., 2016). The electromagnetic field emitted by screens is classified by the International Agency for Research on Cancer (IARC) as a group 2B possible human carcinogen (IARC & WHO, 2013). In addition, in a machine learning-based analytical study conducted with breast cancer and healthy women, the models correctly classified the women according to their exposure to blue light (Mortazavi et al., 2022). Therefore, there is no conclusive evidence that the electromagnetic field emitted by screens causes cancer; however, there are various health concerns about this issue.

Limitations and highlights of the study

The study was conducted at a single center. The study was hospital-based, not community-based. The study

data were collected on a self-report basis. These are the limitations of this study.

This study tried to test an important hypothesis. The study included participants with many types of cancer as the case group, and twice as many controls as cases were recruited. In addition to the classical test results (test statistic and p-value), the study results were also presented in terms of effect size (OR and Cohen's d). These are the highlights of the study.

CONCLUSION

In this hospital-based case-control study of dietary, physical activity, and screen use habits in adults with and without a cancer diagnosis, many dietary and physical activity variables that were thought to be related to cancer at the time of study design were not statistically significant.

In this respect, it is important to read and evaluate this article carefully, considering its limitations. An analysis of the relevant literature shows that some studies have found that dietary, physical activity, and screen use habits are related to cancer, whereas other studies have found no association. The relationship between cancer and dietary, physical activity, and screen use habits, which are an integral part of daily life, is still unclear and needs to be clarified. In addition, uncertainty increases for less common/rare cancers. There appears to be a serious need for community-based case-control and cohort studies to be planned and conducted on this topic.

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