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Review Article

**THE RELATIONSHIP BETWEEN SLEEP DURATION, DINNER
TO BEDTIME, AND COLORECTAL CANCER: A REVIEW OF
THE LITERATURE****Hyder Osman Mirghani¹, Mowffaq Mohammed Kalantan¹**¹Faculty of Medicine, University of Tabuk, Kingdom of Saudi Arabia**Abstract:**

Objectives: There is an increasing awareness regarding sleep duration and colorectal cancer, in the current review we assessed the relationship between sleep duration, dinner-to bedtime to colorectal cancer.

Methods: Eligibility criteria were human studies in English language assessing the effects of sleep duration, dinner-to bedtime on colorectal cancer. An unlimited manual search in PubMed and Google Scholar was conducted using the terms sleep duration, short sleep, prolonged sleep, dinner-to bedtime, and colorectal cancer. Among the 175 articles identified, 20 full texts were assessed and 12 human studies were included. The author name, year of publication, country, methods of the study, number of patients, duration of the study, and the conclusions were reported.

Results: Out of the twelve studies included (33.3% were from the USA, 33.3% from China, and 33.3% were from Europe), nine studies assessed sleep duration all of which except two showed an association with short sleep duration (<7 hours) and prolonged sleep (> nine hours) with colorectal cancer and three investigated the prognosis among colorectal cancer patients and showed an inverse relationship between abnormal sleep and mortality and response to chemotherapy.

Conclusion: An association of sleep duration (prolonged or short), daytime sleepiness, short dinner-to bedtime, and colorectal cancer was found. Raising the awareness of both the patients and the treating doctors about good sleep hygiene effects on colorectal cancer is recommended.

Keyword: Sleep duration, Short Dinner-to bedtime, Colorectal cancer.

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INTRODUCTION:

Colorectal cancer is a major health problem worldwide. In Europe, it is the most common cancer in term of incidence and the second in term of mortality in women and men [1]. Although, the incidence of this morbid and mortal malignancy decreased in the past decade due to effective screening program. However, colorectal cancer is on the rise in some regions likely due to lifestyle and lack healthcare infrastructure and resources [2]. The global burden of cancer is expected to rise due to an aging population and increasing growth and the adoption of unhealthy lifestyles including a sedentary lifestyle, unhealthy diet, smoking, and alcohol consumption [3,4]. Sleep is essential for both mental and physical health, previous studies indicated that short sleep duration is rising and a reduction in long sleep is declining. There is an increasing awareness regarding the association of sleep with various health problems including diabetes, high blood pressure, and cancer [5]. The association of sleep duration with colorectal cancer is controversial, with some studies reporting the association with long sleep duration. Epidemiological studies evaluating the association between colorectal cancer are important because of the investigation of variables that may be too early to be detected by laboratory studies [6]. Thus we conducted this review, in the present study we reviewed the literature to assess the relationship between sleep duration and colorectal cancer.

MATERIAL AND METHODS:

An electronic unlimited search was done for relevant literature published in the English language in the Medline and PubMed database, the keywords sleep duration, colorectal cancer, and dinner to bedtime were used along with the Boolean operators AND or OR. Articles in English on a human were included, forward and backward chaining for articles cited in retrieved publication was applied to get relevant results. The two authors searched and recovered the articles independently for the second stage selection process to avoid duplication of the titles and abstracts, analysis of the relevant data was conducted by the first author. Figure 1. Showed the results of the literature search

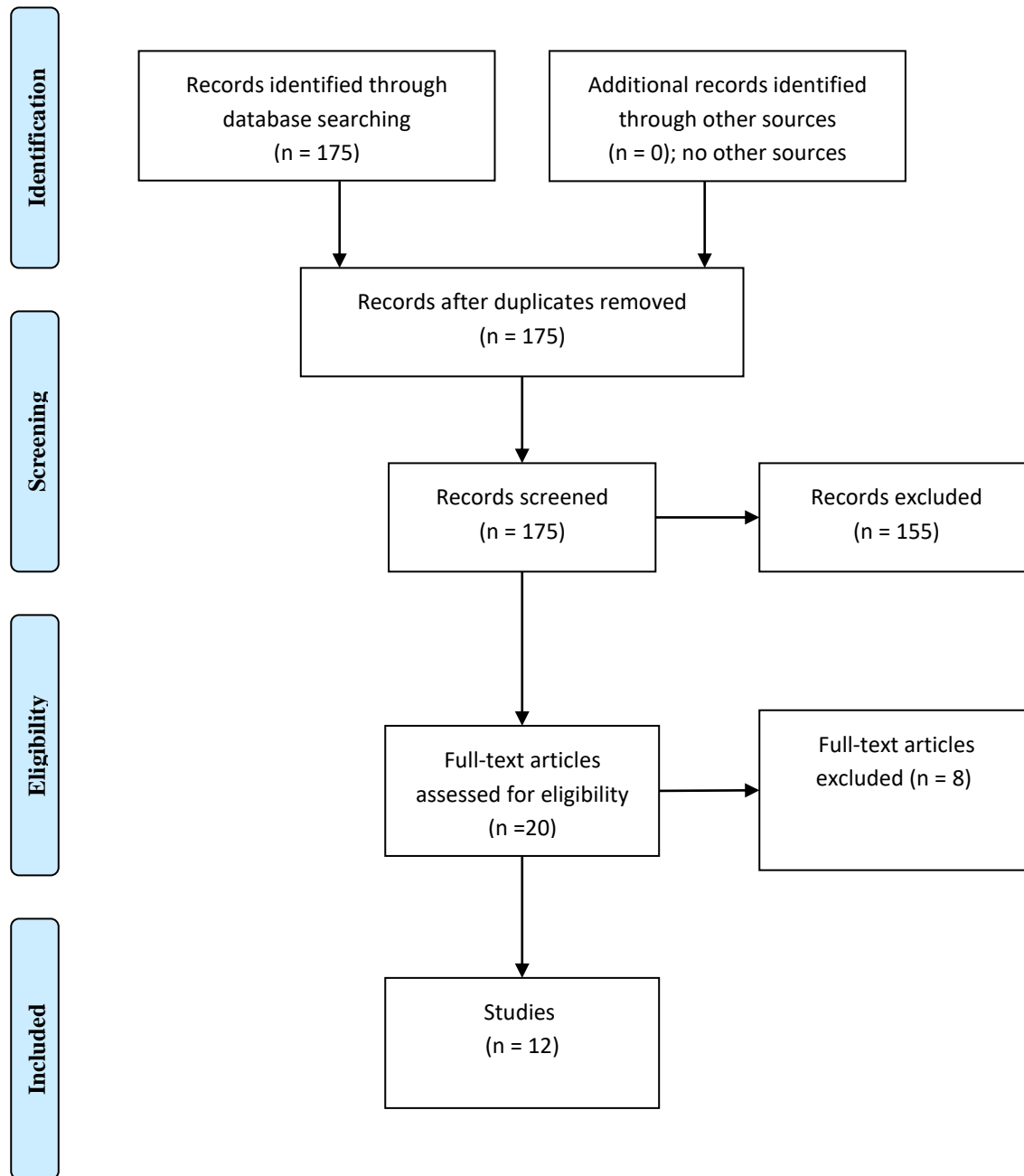
Inclusion criteria:

Previous studies on humans including case-reports and cohorts.

Exclusion criteria: Animals and experimental studies

Statistical analysis:

The Statistical Package for Social Sciences (SPSS, version 20, New York) was used for the data analysis including the author, year of publication, country, article type number of participants, and the duration of follow-up.

Figure 1 – The different phases of the systematic review (PRISMA flowchart).**RESULTS:**

The initial number of manuscripts was 175, the number reduced to 12 after removing duplication and

applying the inclusion and exclusion criteria of which four were meta-analyses, four case-control studies, two prospective cohorts, one retrospective study, and

one post-doc analysis Table 1

Out of twelve studies included (33.3% were from the USA, 33.3% from China, and 33.3% were from Europe), nine studies assessed sleep duration all of which except two showed an association with short

sleep duration (<7 hours) and prolonged sleep (> nine hours) with colorectal cancer and three investigated the prognosis among colorectal cancer patients and showed an inverse relationship between abnormal sleep and mortality and response to chemotherapy.

Table 1. The relationship of sleep duration and dinner to bedtime with colorectal cancer

Author	Year	Country	Study	Patients no	Duration	Result
Thompson et al.	2011	USA	Case-control	1240		Short sleep duration was associated with colorectal neoplasia
Zhao et al.	2013	China	A meta-analysis	723,337		A possible association between prolonged sleep and colorectal cancer
Lu et al.	2013	China	A meta-analysis	555678		Neither long nor short sleep duration is associated with colorectal cancer
Zhang et al.	2013	USA	Prospective cohort	30,121 men and 76,368 women		Overweight participants who snore and sleep >9 hours had increased risk of colorectal cancer
Innominato et al	2014	France	A post-hoc analysis	361 colorectal cancer patients		Subjective sleep problems are associated with poor prognosis and response to chemotherapy
Natale et al.	2015	Italy	Case-control study	226 cancer patients vs. 182 control acitography done		No significant differences between case and controls regarding sleep duration
Hurley et al.	2015	USA	Prospective	101,609 women	15 years	Increased among long sleep duration
Erren et al.	2016	Germany	Synthesis of experimental data and meta-analyses	1500000		Inconclusive
Ratjen et al.	2017	Germany	Comparative study	200 cases with colorectal cancer	7 years	Those who slept ≥ 2 hours/day had higher mortality
Xiao et al.	2017	USA	Retrospective	4869 colorectal cancer patients		Increased mortality among short sleep duration and daytime napping
Lin et al.	2018	China	Case-control	166 colorectal cancer and 166 controls		Long sleep duration ≥ 9 hours, shorter dinner-to bedtime, and no post-dinner walk were associated with colorectal cancer
Chen et al.	2018	China	A meta-analysis	1,550,524 participants		Prolonged sleep duration increased colorectal cancer, but the results were not consistent in the dose-response meta-analysis

DISCUSSION:

In the current review, Thompson et al. [7] conducted a case-control study in the United States of America including 1240 patients and found that short sleep duration is associated with colorectal cancer. A meta-analysis [8] in the year 2013 (723,337 patients included) concluded a possible association between prolonged sleep duration and colorectal neoplasia, another meta-analysis [9] conducted in the same year and included 555,678 participants found no association between sleep duration and colorectal carcinoma, it is important to note that, the latter study included ten prospective studies from PubMed and Embase databases and found a possible association of prolonged sleep and colorectal cancer in subgroup analysis. A prospective study [10] from the USA included 30,121 men and 76,368 women and found that, Overweight participants who snore and sleep >9 hours had increased risk of colorectal cancer. Hurley et al. [11] conducted a prospective study in the USA and concluded similar observation. Lin et al. [12] in their study in China concluded that, Long sleep duration, short bed to dinner, and no post-dinner walk were associated with colorectal cancer, a meta-analysis published in the same country [13] and included 1,550,524 participants found that Prolonged sleep duration increased colorectal cancer, but the results were not consistent in the dose-response meta-analysis. Erren et al. in their Synthesis of experimental data and meta-analyses in Germany [14] that included 150,000 participants found inconclusive results regarding the association of sleep duration and colorectal cancer. On the other hands, Natale et al. in their case-control in Italy [15] that included 226 cancer patients vs. 182 control (acitography was done) found no significant differences between case and controls regarding sleep duration. A post-hoc analysis conducted in France [16] concluded that subjective sleep problems are associated with poor prognosis and response to chemotherapy. The findings of Ratjen et al. [17] were interesting in that, patients with colorectal cancer who slept > two hours/day had higher mortality, similarly Xiao et al. [18] who conducted a retrospective study including 4869 colorectal cancer patients and found an increased mortality among short sleep duration and daytime napping. The strength of the present is study was the unlimited literature search for article assessing the relationship between sleep duration, dinner-to bedtime, and colorectal cancer.

The study limitations were that we did not include all the databases and the search was limited to the English language.

CONCLUSION:

An association of sleep duration (prolonged or short), daytime sleepiness, short dinner-to bedtime, and colorectal cancer was found. Furthermore, good sleep may be associated with less mortality and better response to chemotherapy. Raising the awareness of both the patients and the treating doctors about good sleep hygiene effects on colorectal cancer is recommended. Long randomized control trials are needed to assess the relationship between sleep and colorectal cancer and investigate the underlying mechanisms are highly needed.

Conflicts of interest: None to declare

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