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The window matters: a systematic review of time restricted eating strategies and their effect on cortisol and melatonin secretion

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Time Restricted Eating is an eating pattern based on the circadian rhythm that gives the body a daily fasting period where only water is allowed, it aims to align the body with the circadian rhythm[(1)]. Chrono-nutrition is an emerging field of nutritional science that aims to understand how timing of food-intake may impact our health by affecting our circadian rhythm. Therefore, this systematic review aimed to examine the effects of two patterns of TRE, traditional TRE with a restricted window of eating during the active phase, and Ramadan fasting, during the inactive phase on two markers of circadian rhythm, cortisol and melatonin. A systematic search was performed on PubMed, and Web of Science (all databases) were searched up to December 2020 for studies examining the effects of time restricted eating on cortisol and melatonin. Two independent reviewers screened studies and performed data extraction.

A total of 4093 studies were identified in our search. Fourteen studies met our inclusion criteria, with 13 reporting results on cortisol, and 4 on melatonin. All Ramadan papers (10/14) found statistically significant decrease in melatonin ($p < 0.05$) during Ramadan. Two out of the three Ramadan papers noted an abolishing of the circadian rhythm of cortisol with lower morning and higher evening cortisol levels ($p < 0.05$). The non-Ramadan TRE papers (4/10) did not examine melatonin, and cortisol changes were mixed. In studies comparing TRE to control diets, Stratton et al[(2)] found increased cortisol levels in the non-TRE fasting group ($p = 0.0018$) and McAllister et al[(3)] noted no difference. Dinner-skipping resulted in significantly reduced evening cortisol and non-significantly raised morning cortisol which suggested TRE increased the amplitude of the cortisol rhythm[(4)]. Conversely, breakfast skipping resulted in a blunted/flat diurnal cortisol pattern with significantly reduced morning cortisol[(5)].

In conclusion, our study found a potential blunting of the circadian cortisol rhythm during Ramadan which could result in poor cardio-metabolic outcomes. Moreover, findings of elevated cortisol and reduced melatonin during Ramadan could also lead to poor sleep. There is a paucity of research examining the effects of TRE. The contrasting effect of dinner and breakfast-skipping should be further examined to ascertain whether timing the feeding window indeed has an impact on circadian rhythmicity which could have significant implications on the practical implementation of TRE.

References

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