

IMPACT OF TIMING OF FOOD INTAKE ON HEALTH

Ms Rashmi

Assistant Professor, Chandigarh Group of Colleges, Jhanjeri

rashmi.j1704@cgc.ac.in

Abstract

Our body's energy metabolism and the hormones which regulate appetite is closely associated with circadian rhythm so desynchronization of this could affect overall health easily. Due to midnight wake, daytime sleep, and night time eating, shift workers are more severely affected by this circadian misalignment, a mismatch between endogenous circadian rhythms and behaviour.(Boege et al.,2021).A recently identified risk factor for poor metabolic health is eating later in the day. Timing of caloric consumption relative to melatonin onset is associated with an increased body fat percentage (Andrew et al.,(2017). The goal of this review is to provide an overview of the human research on the effects of changing meal frequency and timing on body weight management, appetite control, energy expenditure, and metabolic health in situations involving energy balance, restriction, and surplus(Hutchison et al.,2016).

Keywords: Metabolism, Hormones ,Circadian , Melatonin , Energy Expenditure

1. Introduction

In modern's world there is massive shift in the working hours or work stress , as a result in order to achieve wealth or success, a very much little attention is paid by individual on quality and timing of food intake . As along with that there is surge in health problems also been observed . So in order to know how much timing of food intake is related to one's health this need to be study in detail.A very well explanation is correlated or explained by the knowledge of circadian rhythm. Circadian rhythm is the repeated 24 hr cycle of physiological processes that occur in a body in order to adapt the environmental changes .These endogenous oscillations of 24 hr periodicity regulate various physiological process such sleep ,metabolism,body temp, hormones ,appetiteand other body functions anticipate with changes of day time to night time and vice – versa(Panda et al.,2019). Thus when our eating patterns become out of sync with the our body's physiological process it increases the probability of getting health affected . From the findings it has been observed that obesity and other cardiometabolic illnesses may be more likely to develop in those who eat large meals or the majority of their daily nutrients in the late evening. While this may be the case when significant amounts of food are consumed at night, evidence is accumulating to show that this result is inconsistent when small, nutrient-dense, low energy diets and/or single macronutrients -200 kcals are preferred .

2. Review of Literature

Kevin parsons Kelly,Owen P Mcguinness,Maciej Buchowski And Jacob J.Hughey (Feb2020) –studied the lipid oxidation of food ingested as per different timing of a day .To see the efficacy of effect of diet aligned with circadian rhythm or internal biological clock, one group preference was giving breakfast and avoiding late night snack whereas in other group nutritionally equivalent meal was given as late evening snack. In addition ,no overnight fast and energy expenditure was altered .The result found is the less lipid oxidation who was fed late evening snack or more lipid oxidation whose nutrient availability coupled with circadian.

Source: Kevin parsons Kelly,Owen P Mcguinness,Maciej Buchowski And Jacob J.Hugh(Feb2020),Eating Breakfast And Avoiding late –snacking sustains lipid oxidation,PLoS biology:e30000622./www.researchgate.net MaciEric Ravissin,Robbie A Bey,Elenora Poggiogalle, Daniel S. Hsia(Aug 2019) - highlight the circadian regulation of appetite .circadian system plays integral role in the temporal regulation of metabolic process as well as food intake to ensure energy efficiency .In addition to light ,master clock is reinforced by other zeitgebers such as timing of food intake and activity.The timing of food intake is potent clue or zeitgeber particularly in gastrointestinal tract .Hence ,TRF Is great tool for the treatment of diet and shiftwork induce metabolic disorder.

Source: MaciEric Ravissin,Robbie A Bey,Elenora Poggiogalle, Daniel S. Hsia(Aug 2019) ,Early time-Restricted feeding reduces appetite and increase fat oxidation but does not affect energy expenditure in humans,obesity,.27(8):1244-125/www.researchgate.net

Satchidananda Panda,Emily N.C.Manoogian and Amandine Chaix (Dec2019)-explained the fact in article in journal of biological rhythms based on various scientific discoveries that in addition to how much and how nutritious food we eat ,when we eat is significant aspect of life. Meal timing proved to be an effective dietary strategy to combat obesity,type 2 diabetes and cardiovascular disease.

Source: Satchidananda Panda,Emily N.C.Manoogian and Amandine Chaix (Dec2019),when to eat : the importance of eating pattern in health and disease, article in journal of biological rhythm./www.researchgate.net

Yanling Xi, Qingming Tang, (.), amd lili Chen ---With the combination of various in vivo and in vitro experiments,the mechanism underlying endogenous circadian oscillations are studied. From this study elucidation of disruption of circadian rhythm and its connection with various disorders has been put forth .Hence , circadian system plays crucial role in the regulation of physiological progression including cell cycle progression ,cytokine release ,hormone secretion ,immune regulation etc .Source:www.ncbi.nlm.nih.gov – article –New Insights into the circadian rhythm and its related disease

Amandine Chaix and Amir Zarrinpar (MAY2015)-Studied about the effect on lipid metabolism and adiposity when time restricted feeding aligned with natural feeding rhythm .experiment was conducted on mice. Thus without altering nutritional intake it prevents and reversed diet induce obesity and its metabolic effect . circadian TRF lead to variation in adipokine signaling and decline white adipose tissue .Genes expressioninvolved in lipid metabolism are generally circadian but Diet induced obesity is responsible for perturbing it and their cyclic expression was restored by TRF.One mechanism by which TRF could affect hostmetabolism is through alteration of gut microbiome.Variation in further gut microbiome get align with changed stool bile acid profile.Therefore, TRF could affect lipid metabolism by changing bile acid signaling.Source: Amandine Chaix amd Amir Zarrinpar (MAY2015), The effects of time- restricted feeding on lipid metabolism and adiposity ,Adiposity 4(4):1-6/www.researchgate .net

References

- [1] De Zwaan, M.; Roerig, D.B.; Crosby, R.D.; Karaz, S.; Mitchell, J.E. Nighttime eating: A descriptive study. *Int. J. Eat. Disord.* 2006, 39, 224–232. [Google Scholar] [CrossRef] [PubMed]
- [2] Manoogian ,N.C..E , Chaix, A. and Panda , P.(2019) When to eat : The importance of eating patterns in Health and Disease Article in Journal of Biological Rhythm DOI:10.1177/0748730419892105
- [3] Serin, Y. And Tek, A. N. (2019) Effect of Circadian Rhythm on metabolic processes and the regulation of energy intake *Ann Nutr Metab* 74:322-330 DOI:10.1159/000500071
- [4] Kelesidis,T. , Kelesidis , I. and Mantzoros,S.C. (2010) Narrative Review : The role of leptin in human Physiology :Emerging Clinical Applications *Annals of Internal Medicine* 152(2):93-100 DOI:10.1059/0003-4819-152-2-201001190
- [5] Kinsey, W. and Ormsbee, J. The Health Impact of Nighttime Eating : Old and New Perspectives *Nutrients* 2015, 7(4), 2648-2662; <https://doi.org/10.3390/nu7042648>
- [6] Hutchison, T. and Heilbronn, K. Metabolic impacts of altering meal frequency and Timing – Does when we eat matter ? <https://doi.org/10.1016/j.biochi.2015.07.025>

- [7] McHill, W., Phillips, JK. And Czeisler,. A. (2017) Later Circadian timing of food intake is associated with increased body fat The American Journal of Clinical Nutrition <https://doi.org/10.3945/ajcn.117.161588>
- [8] Boege, L., Bhatti, Z. and St-Onge, P. (2021) Circadian rhythms and meal timings : impact on energy balance and body weight <https://doi.org/10.1016/j.copbio.2020.08.009>.