



Exploring the Correlation between Insomnia and Iron Deficiency: Implications and Insights

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Abstract

Iron-deficiency Anaemia constitutes a significant public health burden in rural settings, particularly within low- and middle-income countries (LMICs). It is characterized by erythrocyte (red blood cell) deficiency or low haemoglobin concentration; this condition can lead to severe morbidity, especially impacting vulnerable populations like children and pregnant women. Anaemia, manifested by depleted haemoglobin levels, is associated with a variety of clinical presentations including fatigue and asthenia, which can disrupt sleep architecture. Delineating the established association between Anaemia and sleep disturbances has the potential to inform the development of comprehensive interventions aimed at improving overall health outcomes in rural populations. Numerous recent studies examining genome-wide associations have indicated that there may be genetic similarities between Anaemia and Insomnia. So, an increased risk of insomnia in adults was found to be substantially correlated with Anaemia.

Keywords: Anaemia; Insomnia; Haemoglobin; Rural; Iron-Deficiency

Introduction

A person with anaemia has fewer red blood cells than normal. Haemoglobin and haematocrit measurements on red blood cells themselves are typically used to diagnose anaemia an iron or vitamin B12 deficiency can cause anaemia in humans [1].

Because red blood cells contain haemoglobin, they are essential for carrying oxygen from the lungs to the rest of the body. Anaemia is characterized by a reduction in red blood cells that carry oxygen to vital organs. This oxygen deficiency results in anaemia symptoms such as weakness, thirst, sweating, fast breathing and exhaustion. Anaemia can sometimes occur in people without any symptoms, particularly if it is moderate or develops gradually over time [2].

People who were anaemic were more likely to experience sleeplessness [3].

It is interesting to note that MEIS1, a gene linked to iron-deficiency anaemia (IDA) and restless legs syndrome (RLS), also shows pleiotropic for insomnia, according to several recent genome-wide association studies [4].

As far as we are aware, though, there have only been three studies that have looked at the connection between adult anaemia and insomnia, and all three have found it. The inability to account for certain significant confounders (such as other sleep characteristics and the state of inflammation) limits these investigations. Furthermore, there was no investigation of the dose-dependent link between haemoglobin levels and sleeplessness [5-7].

An increased risk of sleeplessness has been linked to anaemia. A second meta-analysis on this subject provided more evidence in support of this conclusion. Additionally, a sex difference was noted; for men, the link was considerable, but not for women [3].

Relation between Anaemia & Insomnia

Insufficient sleep or difficulty falling asleep has been associated with anaemia, both iron-deficiency and non-iron-deficiency. But the relationship between anaemia and sleep problems is not quite clear-cut [6].

According to several researches, anaemia may be the source of sleep-related neurotransmitters including dopamine and serotonin. These neurotransmitters are produced by iron, which is required for their synthesis. As a result, individuals with iron-deficiency anaemia may have reduced amounts of these neurotransmitters. Because iron deficiency anaemia alters the synthesis of these neurotransmitters, it may be a factor in sleep issues [8].

One explanation for non-iron-deficiency anaemia is that it results in weariness, which in turn aggravates sleep. If fatigue prevents someone from exercising or from spending as much time in the bright sun, it may also have a negative effect on sleep quality and wakefulness [9].

Low iron levels have been related in studies to a number of sleep problems and diseases, such as obstructive sleep apnea and restless legs syndrome. Iron supplements may occasionally be able to relieve with these issues [10].

An increased risk of depression and cognitive decline is linked to insomnia in older adults [11].

Anaemia was found to be more common in older men and women in the middle tertile of insomnia symptom frequency in the English Longitudinal Study of Aging; in men only, lower haemoglobin was linked to both insomnia frequency and shorter sleep duration [7].

Anaemia throughout one's lifetime was linked to a higher prevalence of insomnia, according to a second study conducted on older South Koreans [5].

Further evidence for a possible connection between blood oxygen levels and brain function came from a recent neuroimaging study in the BLSA that connected cerebral blood flow in the front temporal and other brain regions to both haemoglobin levels and anaemia status [12] and a different BLSA study connected cortical thinning in front

temporal regions with shorter sleep duration [13].

Discussion

The connection between insomnia and non-iron-deficient anaemia could have important clinical implications. If insomnia leads to anaemia or if anaemia makes insomnia worse, then treating one might help with the other. If non-iron-deficient anaemia is a sign of other medical problems or general weakness causing insomnia, it could prompt doctors to look for and treat these underlying issues. If insomnia is an indicator of non-iron-deficient anaemia, finding both conditions could signal other health problems or frailty in older adults that need attention. More observational studies in humans and experiments in animal models are needed to understand these associations better [6].

People of all ages, including new-borns, children, adults, and older adults, have been found to have the tendency to sleep less, which is linked to both iron-deficiency anaemia and non-iron-deficiency anaemia [9]. In case of iron deficiency which is associated with insomnia, the patient can get relief from both the problems simultaneously. Research has found that anaemia is associated with an increased risk of insomnia. Additionally, some studies have observed sex differences in this relationship, with the association being significant in men but not in women. Recent findings linking iron deficiency to sleep problems suggest that doctors should consider anaemia when diagnosing sleep disorders like insomnia. Treatments for iron-deficient anaemia typically involve iron supplements, dietary adjustments, and lifestyle changes, which can also improve sleep quality. Many iron-rich foods that help maintain healthy iron levels are also beneficial for sleep. These include dark leafy greens, nuts, seeds, legumes, and grass-fed meats. Additionally, fish rich in omega-3 fatty acids are good sources of iron and support better sleep, making them beneficial for addressing both anaemia and sleep issues [14].

Conclusion

In conclusion we have been know that poor sleepers were more likely to be female and exhibited higher levels of depression compared to good sleepers. Depression, haemoglobin levels, and the duration of haemodialysis were identified as the most significant predictors of overall sleep quality among poor sleepers. Patients who have iron deficiency also start suffering from insomnia simultaneously. Whenever a patient has iron deficiency, a history of insomnia should be taken which is associated with that problem. For this reason, both the problems can be treated together.

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