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A Clinical Study on Assessment of Psychological Stress and Sleeping Quality in Patients of *Pandu Roga* Vis-A -Vis Iron Deficiency Anemia (IDA)

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ABSTRACT

Introduction – Iron deficiency is very common cause of anemia in the world and is more dominant in women than men. Iron deficiency anemia (IDA) is considered as a nutritional deficiency disorder. Ayurveda has also given description about a similar disease *Pandu Roga* (a disease entity with clinical picture resembling anemia) in *Charak Samhita, Pandu Roga Adhyaya* wherein the disease has been described to be caused also due mental or psychological stress. Sleep is reported to be affected negatively by psychological stress. Further, a research paper on sleep quality in IDA patients, also reported for bad sleep quality in them as compared to controls. Based on the above concept of Ayurveda and contemporary medical science, the following paper aims to assess the psychological stress status and sleeping quality in the patients of IDA (comes under the umbrella of *Pandu Roga*) as compared to healthy controls.

Material and Methods - 30 newly diagnosed cases of IDA (*Pandu Roga*) from the OPD and IPD of the institution were assessed for stress by Perceived stress scale (PSS) and sleeping quality by Pittsburg sleeping quality assessment index (PSQI) and compared to 30 healthy controls to observe for any relationship. The data was analysed statistically using IBM SPSS version 16.0 (Illnois,USA.) and GraphPad Prism 5 (GraphPad Software Inc, CA, USA). Statistical significance was considered among the groups ($p < 0.05$).

Observation & Discussion - It was found that 56% of patients and 30.5% controls reported a bad sleep quality. The total Pittsburgh sleep quality index score was 6.56 ± 0.32 in patients and 6.23 ± 0.23 in controls as revealed by PSQI. Assessment of stress status by PSS revealed severe PSS with value 24-30 found in 6 cases as compared to 3 controls and moderate PSS of 14-23 was found in 20 cases as compared to 19 controls. The total Mean perceived stress score in cases was observed 20.10 ± 0.60 and 19.20 ± 0.94 in controls. No statistically significant



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correlation was observed between PSS and Hb values in controls and PSS and sleeping quality in both cases and controls.

Conclusion – The study reveals some scientific evidence to the etiopathological part of psychological factors *Chinta* (stress), *Shoka* (grief), *Krodha* (anger or frustration) and *Bhaya* (fear) in the causation of *Pandu Roga* (IDA). There seems to be cause and effect relationship between stress and IDA. Sleeping quality was found deteriorated in the cases as compared to controls. However, the study revealed no association between stress and sleep quality.

KEYWORDS

Iron deficiency anaemia, Pandu Roga, psychological factors, sleep quality, stress



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INTRODUCTION

Iron deficiency is the most common cause of anemia in the world and it distresses around two billion people worldwide¹. Iron deficiency anemia (IDA) is primarily described as a disease occurring due to nutritional deficiency and is more rampant in women than men. IDA is considered as a nutritional deficiency disorder. Ayurveda has also given description about a similar disease, *Pandu Roga* (a disease entity with clinical picture resembling anemia) in *Charak Samhita, Pandu Roga Adhyaya* wherein the disease has been described to be caused also due to psychological stress [*Chinta* (worry or stress), *Bhaya* (fear), *Krodha* (anger or frustration)².

Few experimental researches of contemporary medical science have also described for the causation of IDA by mere stress (metabolic stress)³. Sleep is documented to be affected negatively by psychological stress⁴. Further, a research paper on sleep quality in IDA patients, also reported for bad sleep quality in them as compared to controls⁵. However, Ayurveda describes increased sleeping tendency (*Nidralu*) as a clinical presentation of the disease *Pandu Roga*. Based on the above concept of Ayurveda and contemporary medical science, in this paper manasika bhavas the psychological stress status and

sleeping quality in the patients of IDA (comes under the umbrella of *Pandu Roga*) as compared to healthy controls. In this context, previous studies on sleep and IDA have been performed in pediatric populations and in adult population also, a study has evaluated sleep, hospital anxiety and depression in IDA patients⁶. Previously a study has been done on assessing subjective sleeping quality in psychiatric disorders⁷ earlier but till now, no similar study has been done on examining subjective sleep quality in adult patients with IDA and status of stress in the adult patients of IDA.

PRIMARY OBJECTIVE

To study the status of psychological stress through perceived stress score (PSS) and sleeping quality through Pittsburg sleeping quality assessment index (PSQI) in the patients of *Pandu Roga* (IDA) and healthy controls.

SECONDARY OBJECTIVE

To study any correlation between hemoglobin, stress levels, sleeping quality.

MATERIALS & METHODS

This study was carried out in the OPD, IPD and Clinical Pathology Laboratory (CPL) of the institute after the approval of institutional Ethics Committee and CTRI



registration (CTRI /2018/06/014627). The cases for this study were registered from July 2018 to November 2019.

Inclusion & Exclusion Criteria

Cases: 30 freshly diagnosed cases of IDA, not on any treatment, with haemoglobin levels as per CSIR, Hyderabad, India, [Hb \leq 13 g/dl (Male), Hb \leq 9.4 g/dl (Female)]; serum ferritin level below 15 ng/ml; not associated with any other disease; age group 18–55 years were included for the study from OPD, IPD and Pathology Laboratory of the institute, after their due written informed consent. therapeutic induced anemia (ex. Ibuprofen, NSAID's, Aspirin), accompanying systemic, endocrinal or neurological diseases like diabetes mellitus, hypertension, congestive heart failure, chronic obstructive pulmonary disease, coronary artery disease, rheumatoid arthritis, systemic lupus erythematosus and ankylosing spondylitis, any medication use, gestational anemia and patient and subjects not willing to submit consent for the study were excluded in this study. IDA was diagnosed on the basis of Complete blood count (CBC), General blood picture (GBP) and serum ferritin.

Controls: For control group 30 non-anemic, healthy volunteers, age group 18–55 years, either sex, having no history of any disease for the past 6 months were

included after their due written informed consent.

Study Design: Exploratory analytical case control study.

METHODOLOGY

The cases and controls were properly assessed with complete history, clinical and laboratory examination so as to ascertain for the inclusion and exclusion criteria. Then, they were assessed for stress by perceived stress scale (PSS) and sleeping quality was assessed by Pittsburg sleeping quality assessment index (PSQI). The PSS⁸ includes 10 items connected with ones feelings and thoughts during the last month. The response to the scale also depends upon the perception of the individual for the different events occurring in their life, hence the scale is to be filled by the subject as a self-assessment tool. Increasing scores indicate higher stress, with values from 14–26 in the range of moderate stress and 27–40 as high stress. PSQI consists of 19 items spread over 7 domains which include components like subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbance, use of sleep medications and daytime dysfunction. Increased PSQI scores show worsening sleep quality, with values over 6 or greater indicating a “poor” sleep⁷.



The data obtained from above was entered and analysed using statistical software IBM SPSS version 16.0 (Chicago, IL, USA) and Graph pad Prism 5 (GraphPad Software, CA, USA). Continuous variables are presented as means \pm SDs. Categorical variables are showed as percentages. The patients and controls were compared using independent sample t-test. Correlation was analyzed using Pearson's correlation coefficient. Statistical significance was considered among the groups at the level of $p < 0.05$.

RESULTS

Out of 30 IDA patients 22 were female and 8 were male. Out of 30 healthy volunteers 24 were female and 6 male. The mean age of the cases was 33.73 ± 1.66 and controls

were 28.87 ± 0.99 . The mean haemoglobin in cases was found 8.29 ± 0.25 and control was 13.99 ± 0.70 .

In PSQI, The total Pittsburgh sleep quality score was 6.56 ± 0.32 in patients and 6.23 ± 0.23 in controls. In terms of total PSQI score, there was not a statistically significant difference between the two groups ($t = 0.82$, $p = 0.41$).

Assessment of stress status by PSS revealed severe PSS with value 24-30 found in 6 cases as compared to 3 controls and moderate PSS of 14-23 was found in 20 cases as compared to 19 controls. The total mean perceived stress score in cases was found to be 20.10 ± 0.60 and 19.20 ± 0.94 in controls with no statistically significant difference between the two ($t = 0.82$, $p = 0.42$) (Table 1).

Table 1 Stress status by Perceived stress scale (PSS) (Range between 0-40 score) in IDA cases and healthy controls

S.No.	Stress status	Frequency in IDA cases	Frequency in Healthy controls	Unpaired t test
1.	Low stress (0-13)	4	8	t=0.79
2.	Moderate stress (14- 23)	20	19	p=0.42
3.	Severe stress (24-40)	6	3	(Difference not statistically significant)
Mean value \pm SD		20.10 \pm 0.60	19.20 \pm 0.94	

The study of correlation between PSS and Hb. or between PSQI and Hb and PSS and PSQI didn't reveal any statistically significant association.

DISCUSSION

Previous studies on IDA have documented the occurrence of many developmental

symptoms by affecting transmitters such as serotonin, noradrenaline and dopamine, myelination, and the metabolic activity in the neurons^{9,10}.

Importance of good sleep and its quality:

Sleep plays a vital role in good health and well-being throughout your life. Getting



enough quality sleep at the right times can help protect Mental health, Physical health, Quality of life and Safety.

Sleep is essential as it is as important to our bodies as eating, drinking and breathing and is vital for maintaining good Mental and Physical health. Sleeping helps us to recover from Mental as well as Physical exertion.

In children and teens, sleep also helps support growth and development. The damage from sleep deficiency can occur in an instant (such as a car crash), or it can harm you over time. For example, ongoing sleep deficiency can raise your risk for some chronic health problems.

Role of Psychological factors (PS) in PANDU ROGA

Pandu Roga is one of the disease entity described in Ayurveda which has clinical symptoms similar to that of anaemia. *Maharishi Charaka* has specially described some of Psychological factors (P.F.) amongst which *Chinta* (excessive worry), *Bhaya* (fear), *Shoka* (grief) are the three main factors, which play a significant role in causing this disease¹¹.

The association between psychological factors and *Pandu Roga* is a direct cause and effect relationship as excessive worry or stress (*Chintyaanam cha Atichintanaat*) has been described as an specific etiological factor for the vitiation of *Rasa Vaha Srotas*

¹²(channels carrying the first tissue element of the body formed from the digested nutrients) as “*Pandu Roga is a Rasa Pradoshaja Vikara.*”¹³⁻¹⁴.PS also has some other impacts on the body, as it is responsible

❑ for generalized debilitation of the body

❑ for decreased strength and immunity status of the body

Iron deficiency has been reported to cause behavioral and developmental symptoms by affecting transmitters such as serotonin, noradrenaline and dopamine, myelination, and the metabolic activity in the neurons¹⁵⁻¹⁶ due to the fact that Iron plays a key role in the metabolism of monoamines in the brain thus iron deficiency leads to symptoms such as apathy, drowsiness, irritability and lack of attention occurring due to impaired monoamine oxidase activity¹⁷. Patients affected from iron deficiency display many behavioral and emotional signs and have symptoms similar to the ones in depressive individuals.

Sleep is the period of physiological, periodic and reversible changes in consciousness and behavior¹⁸. It is defined as a reversible state where interaction of the organism with the environment is lost temporarily, partially and periodically¹⁹. Nearly 30–33% of the society has a



significant sleep problem. The said ratio is higher in older adults, those having a psychiatric disorder and specific groups with learning difficulties²⁰⁻²¹. In various studies, advanced age, female gender, stress, depression, anxiety, alcohol, substance abuse and physical diseases are the important factors causing sleep disorders²²⁻²³. These *P.F.* leading to stress which have a very hazardous effect on sleeping pattern that lead to a negative effect on our physical as well as mental health²⁴. Chronic sleep restriction and not following the circadian process of sleeping hour has become an alarming problem nowadays.

Due to the key role of iron in the metabolism of monoamines in the brain and the role of the same monoamines in sleep physiology, we stipulated that sleep quality might deteriorate in IDA.

Some related researches-

Peirano et al reported that relative to controls, children with IDA showed: a) longer duration of REM sleep episodes in the first third and shorter in the last third; b) more REM sleep episodes in the first third and fewer in the second third; and c) shorter latency to the first REM sleep episode and shorter NREM stage So, their results show that IDA is associated with long-lasting alterations in the temporal organization of sleep patterns²⁵.

Peirano et al. suggested that the changes in the neurotransmitter metabolism due to iron deficiency, psychological status or a possible restless leg syndrome (RLS) affects sleep negatively. Depression and anxiety disorders are among the psychological disorders that affect sleep quality negatively. In a study conducted by Onder et al., depressive disorder was found to be a common disorder in patients with anemia²⁶. Son et al. reported that cognitive functions were worse in anemia patients when compared to healthy controls, which was shown to be associated with depressive disorder²⁷.

CONCLUSION

The discussion reveals that the scientific explanation to the etiopathogenesis of *Chinta Shoka* and *Bhaya* in the causation of *Pandu Roga* as there is a direct cause and effect relationship between Stress and iron deficiency anaemia. As analysed, Perceived stress - Moderate and Severe is found to be more in patients of IDA as compared to healthy volunteers. The results also showed that IDA affects sleep quality which is influenced by psychological factors such as depression and anxiety in the form of Stress as subjective sleep quality was found to be worse in patients with IDA when compared to the healthy controls. .So, Appropriate



sleeping and keeping in mind the proper sleeping habits/quality (following Proper *Raatricharya*) is a very important and essential factor to increase quality of life as well as improve mental health in healthy as well as diseased patients.

Conflict of interest statement:

There is no conflict of interest.



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