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Research Article

An Observational Study on the Etiopathological Factors of *Pandu roga* in the Patients of Various Anemias

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Abstract: Anemias have got a very high prevalence rate in the world over and in spite of the massive efforts of the modern medical science; a good control has not been achieved. Recent studies have shown the involvement of other factors too in the pathogenesis, besides the causes established till date. Such new associations are reflecting the need to study the association of other unexplored factors also in anemia and incorporate them in the treatment module to combat anemias more successfully. Some hints about these aetiological factors can be obtained from the study of *Pandu roga* of *Ayurveda*, as these two diseases bear great resemblance clinically and in treatment. This study aimed to explore the association of the aetiological factors of *Pandu roga* in the patients of various anemias. The study revealed significant association for the aetiological factors of *Pandu roga* in anaemic patients and demonstrated that the consideration and avoidance of these aetiological factors also needs to be done along with the treatment module to combat anemias still more effectively.
Keywords: Anemia, *Pandu roga*, Aetiological factors, *Mrittika bhakshana*, Nidanas.

INTRODUCTION

Nidana has been given a lot of importance in Ayurveda. The word *nidana* carries a broad sense and refers in particular to the aetiological factors of the disease. Two kinds of aetiological factors have been described for a disease in *Ayurveda*. The *samanya nidanas* or the general aetiological factors which if taken will lead to the development of the disease. These aetiological factors are sufficient to complete the aetiopathogenesis of the disease. The *vishishta nidanas* or the specific aetiological factors which if coupled with the former gives rise to the particular *doshika* (~ pertaining to a particular *dosha*) predominance in the manifestation of the disease.

The general aetiological factors of *pandu roga* have been described by all the *acharyas* [1, 2]. They are *ati vyayama* (excessive physical exercise), *ati vyavaya* (excessive indulgence in sexual activity), *ati amla* (excessive use of sour foods), *ati lavana* (excessive use of salt), *ati madya* (consumption of alcohol in large amounts/ daily usage), *mrida bhakshana* (eating mud/pica), *ati divaswapna* (sleeping during the day) and *ati teekshna* (consumption of very spicy items in large amounts).

Acharya Charaka [1] has additionally described the following factors in the general aetiological factors - k*shara ati sevana* (excessive use of *kshara* which are a group of drugs in Ayurveda), u*shna ati sevana* (excessive use of very hot substances or hot atmosphere), v*iruddha bhojana* (use of mutually contradictory foods), a*satmya bhojana* (use of food to which, one is not used to), v*idagdha bhojana* (use of food which is excessively cooked), usage of *nishpava* (excessive usage of *Sema - Dolichobiflorus lublub*), usage of *masha* (excessive usage of *Phaseolus mungo*), usage of *pinyak*a (the remnant after extraction of oil – oil cake), t*ila taila* (excessive usage of oil of *Sesamum indicum*), v*ega vidharana* (holding of the natural urges especially of vomiting), r*itu vaishamya* (not following the seasonal regime), p*ratikarma vaishamya* (not following the purificatory procedures of the body properly and not following the wholesome regimen after the therapy as advised by the physician).

Besides these, he has also described some psychological factors specifically as k*ama* (excessive thinking about sex), c*hinta* (worrying in excess), *bhaya* (fear), k*rodha* (anger) and *shoka* (grief).

Regarding the specific *doshika* aetiological agents, no definite description about any particular

aetiology has been made. However, *mrittika bhakshana* (eating mud) has been described as an aetiological factor for *Mrittika Bhakshana janya Pandu roga*.

Though numerous studies have been done on *Pandu roga* and anemias but no work has been done to find the association and the occurrence of aetiological factors of *Pandu roga* in the patient of various anemias. This study aimed to study for the presence of the above stated aetiological agents in the patients of various anemias and observe for their scientific basis.

MATERIAL AND METHODS

The study was approved by the institutional ethics committee. 100 cases of anemia were included in the study, after their due written informed consent.

Inclusion Criteria

The patients of all age and sex, having haemoglobin value lower than that considered normal in relation to the age and sex of the individual and having the clinical features of *pandu roga* {as described in *Charaka Samhita* - *samanya lakshanas* of *pandu*} (Appendix I) were included for the study.

Exclusion Criteria

The cases of anemia associated with either chronic inflammation or systemic disease or therapeutic induced anemia were excluded from the study to avoid the interference in the study from the association of the aetiological factors of those diseases which could give erroneous results.

Plan of Study

First of all, the aetiological agents of *Pandu roga* described in the various texts were compiled and deciphered to the forms used today in the study area; and were then organised in the form of a performa (Appendix II). All the cases registered for the study were then evaluated clinically and investigated thoroughly to establish the type and cause of anemia and were recorded on the above performa. For the purpose of recording of observations, the cases of anemia were assembled according to the main cause identified in them into five main groups as -

- Group 1- Haemolytic Anemias
- Group 2- Dual Deficiency /Anemia (Iron and vit B12 *I* Folic acid deficiency)
- Group 3 - Megaloblastic Anemia (B_{12} and Folic acid deficiency)
- Group 4 - Iron Deficiency Anemia
- Group 5- Anemias due to Bone Marrow Failure

The observations on aetiological factors were recorded in these 5 groups and statistical tests were applied to test for significance.

Statistical analysis

The data collected was transferred on master chart showing various items/variables in columns and subjects in rows. The analysis of data was done using statistical software SPSS version 16.0 using Pearson chi-square test and Z – test for single proportion. $p < 0.05$ was considered as statistically significant.

RESULTS

Majority of the aetiological factors of *Pandu roga* showed highly significant statistical resultsfor their presence in the patients of anemias ($p < 0.05$)(Table 1).

The table demonstrates that majority of the aetiological factors of *Pandu roga* show highly significant statistical results ($p < 0.05$) for their presence in the patients of anemias.

Amongst the above stated aetiological factors an inter group comparison using chi-square test reveals high statistical significance (Table 2) for alcohol consumption, consumption of hot food items and excess exposure to heat, pica, holding the natural urges, excessive physical exercise, worry or stress, fear and anger ($p < 0.05$).

The number given in each column indicates the number of patients in whom the particular aetiology was found. Number within the bracket shows the percentage value for the same number for it's within the group value (%).

Consumption of very hot food items and residing and working in very hot climate was found quite significantly in group 2 and in group 4 (in 50 % and 33 % of the patients of the group respectively), while eating mud was found to be a very significant aetiological agent in group 4 (19% of the patients of the group amounting to 55 % of the total patients showing this aetiology) and a bit less significantly in group 2 (38% of the patients of the group amounting to 33 % of the total patients showing this aetiology). Alcohol consumption was found maximally in the patients of group 3 (33 % of the group; 58 % of the total). The retention of the natural urges of stool and urine was found highly significantly in the patients of group 4 (56 % patients of the group which amounted to 75 % of the total patients in whom this aetiology was found). Excessive physical exertion and exercise was found predominantly in both the groups 4 and 2 (70 % and 50 % of the patients of the group).

Amongst the Psychological factors stress, fear, anger and grief were found significantly as a cause in the patients; however, high statistical significance ($p < 0.05$) was obtained for stress, fear and anger. It is also interesting to note here that stress was found in the majority of cases of group 4, 3, 2 and 5, though most significantly in group 4. Anger was found more in group 4 and 3 while fear in group 2.

Table 1: Showing the statistical significance for the presence of *aetiological factors* of *Pandu Roga* in the total patients of anemias (n = 100)

Aetiological factors of *Pandu roga*	No. of patients in whom the aetiology was found to be present	Z value	p value
A ml a (sour foods)	52	4	< 0.001
Lavana (salty foods)	51	2	< 0.05
Madya (alcohol)	12	- 7.6	< 0.001
Ati Teekshna (spicy food items)	43	- 1.4	> 0.05
Ati Ushna (excessively hot foods and environment)	18	- 6.4	< 0.001
Kshara Sevana (~use of alkalies)	1	- 9.8	< 0.001
Nishpava (*Dolichobiflorus lublub*)	13	- 7.4	< 0.001
Masha (*Phaseolus mungo*)	12	- 7.6	< 0.001
Mrittika Bhakshana (PICA)	9	- 8.2	< 0.001
Viruddha Bhojana (incompatible diet)	1	- 9.8	< 0.001
Asatmya Bhojana (unwholesome food)	0	0	-
Diwaswapna (sleeping during the day)	31	- 3.8	< 0.001
Vega Vidharana (retention of natural urges)	20	6	< 0.001
Ati Vyayama (excessive exertion)	44	1.2	> 0.05
Chinta (stress/worry)	74	4.8	< 0.001
Bhaya (fear)	39	- 2.2	< 0.05
Krodha (anger)	38	- 2.4	< 0.05
Shoka (grief)	39	- 2.2	< 0.05
Pinyaka (oil cake)	0	00	-
Til Taila (oil of *Sesamum Indicum*)	0	0	-
Ritu Vaishamya (not following the seasonal regime)	0	0	-
Prati Karma Vaishamya (not following the physician's advice)	0	0	-
Kama (excess thinking of sex)	0	0	-

Table 2: Showing the presence of *Nidanas* (etiological factors) of *Pandu Roga* in the various groups of anemias

Nidanas	**Gr 1 (n=32)**	**Gr 2 (n=8)**	**Gr 3 (n=21)**	**Gr 4 (n=27)**	**Gr 5 (n=12)**	**Total (n=100)**	**X^2 value**	**p value**
Amla	20 (63%)	6 (75%)	11 (52%)	11 (41%)	4 (33%)	52	6.15	>.05
Lavana	17 (53%)	6 (75%)	9 (43%)	15 (56%)	4 (33%)	51	4.18	>.05
Madya	1 (3%)	0 (0%)	7 (33%)	3 (11%)	1 (8%)	12	12.70	<.05
Ati Teekshna	15 (47%)	6 (75%)	9 (43%)	9 (33%)	4 (33%)	43	5.02	>.05
Ati Ushna	4 (13%)	4 (50%)	2 (10%)	9 (33%)	2 (17%)	21	9.728	<.05
Mrittika Bhakshana	1 (3%)	3 (38%)	0 (0%)	5 (19%)	0 (0%)	9	15.53	<.01
Viruddha Bhojana	1 (3%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1	2.14	>.05
Diwaswapna	14 (44%)	1 (13%)	4 (19%)	10 (37%)	2 (17%)	31	6.72	>.05
Vega Vidharana	2 (6%)	1 (13%)	0 (0%)	15 (56%)	2 (17%)	20	30.72	<.001
Ati Vyayama	10 (31%)	4 (50%)	5 (16%)	19 (70%)	6 (50%)	44	13.49	<.01
Chinta	17 (53%)	7 (88%)	17 (81%)	25 (93%)	8 (67%)	74	13.72	<.01
Bhaya	23 (72%)	5 (63%)	1 (5%)	7 (26%)	3 (25%)	39	29.67	<.001
Krodha	5 (16%)	6 (75%)	8 (38%)	17 (63%)	2 (17%)	38	20.90	<.001
Shoka	17 (53%)	3 (38%)	5 (16%)	11 (41%)	3 (25%)	39	5.75	>.05

DISCUSSION

Usage of excessively sour, salty and spicy foods and food with preservatives was identified in approximately 50% of the cases as one of the factors. This finding was due to the fact that now a day such kinds of food have become very popular and have imbibed in our life style. People are not consuming all the six tastes as has been advocated in Ayurveda. They are abstaining from sweet items due to weight and calorie consciousness and also have restricted the use of diets which have bitter and astringent tastes, mainly because they are not very palatable. There is a lot of negligence in the people on the aspect of healthy diet and food is now being taken just in view of satisfying hunger and their caloric content, vitamin and mineral contents. This has resulted into a lot of diseases in the people. No scientific studies are though available till now, to validate the effect of *shadrasatmaka* (having all

the six tastes i.e. sweet, sour, salt, bitter, pungent and astringent) diet on health. All the above stated three types of food items are *pitta* (one of the three *doshas* in ayurvedic concepts) vitiating ones and *pitta* is the predominant *dosha* in this disease i.e. *pandu roga.*

Alcohol consumption has now been proved to have a role in causing the Megaloblastic anemias. It is also associated with consequences as the suppression of blood cell production or hematopoiesis, especially in people with severe alcoholism, who also may suffer from nutritional deficiencies of folic acid and other vitamins that play a role in blood cell development. Chronic excessive alcohol ingestion reduces the number of blood cell precursors in the bone marrow and causes characteristic structural abnormalities in these cells, resulting in fewer-than-normal or nonfunctional mature blood cells. As a result, alcoholics may suffer from moderate anemia, characterized by enlarged, structurally abnormal RBC's; mildly reduced numbers of WBC's, especially of neutrophils; and moderately to severely reduced numbers of platelets [3, 4].

Consumption of very hot food articles was reported maximally in the form of tea and coffee. It has been stated in the literature that tea consumption is associated with anemia [5-7]. Some of the studies have emphasized that tea reduces iron absorption, while the iron stores in people with adequate iron stores remain unaffected [7-10]. Recently, a publication has reported that green and black tea have the potential of reducing folic acid bioavailability also [11]. Drinking tea at the breakfast and in the evening, also several times in the day is a common practice in people in India. A*ti ushna* was reported in some of the patients in the form of working in the open, under direct exposure to sun. Ayurveda describes that heat causes the vitiation of pitta and rakta (~blood) as the mechanism behind this aetiology in the causation of Pandu (~anemia). Some of the recent studies have quoted that heat causes oxidative damage to the RBCs and haemolysis them [12]. Another study reports that repeated exposure to thermal stress results in decreased serum iron and increased hepatic iron content (two hours after exposure) which may contribute to anemia in individuals [13].

Mud consumption has also been related in Ayurveda to be related to the development of worms in the abdomen. Modern science literature also states that worm infestation as a result of coming in contact with the mud or ingestion of mud leads to blood loss and such chronic blood loss results in iron deficiency anemia in the long course. PICA has also been associated with folate, and B12 vitamin deficiencies also, along with that of iron to the extent of 82.4%, 41.2%, and 70.6% respectively [14]. However, it is a very important finding to note the relatively low incidence of mud ingestion as an aetiological agent. This demonstrates the improved sanitation awareness and condition as seen today in the study area.

Incompatible diet was found in only one subject and that was of fish with milk, however no scientific studies are presently available to explain its mechanism of action.

The study also found urge retention and excessive physical activity to be responsible for having a role in causing iron deficiency anemias, probably by causing more stress in the patient. Recent researches performed in the context of excessive exercise (in the form of 1600 km ultramarathon) have stated that the haemoglobin, packed cell volume, mean red cell volume, serum iron, total iron binding capacity, and percentage transferrin saturation has been found decreased in the subjects (on the 4^{th} and 8^{th} day after the event) when compared to the values before the event [15]. Further such studies are going on in subjects on the effect of excessive physical exercise in the form of half marathon have proposed erythrocyte haemolysis and oxidative stress mechanisms responsible for it [16].

Though no scientific evidences are present to explain the mechanism and the role of retention of the natural urges in causing anemia, still practically it's a proven fact that complete evacuation in the morning is very determining factor for the appetite and digestion process during the rest of the day. Ayurveda describes that vata gets vitiated due to it and consequently the whole physiology of gut is altered and hampered in the due course of time, if such retention of natural urges persists.

The association of some psychological factors as stress, anger, fears and grief in the patients of anemia as found in the study, points to the undermined role of these factors in the consideration for treatments. Association between stress and anemia has now got scientific evidence. A study reports of altered iron metabolism in the body with decreased serum iron and increased tissue iron stores with exposure to even short durations of psychological stress [17-19]. These factors have now become an integral part of our lifestyle and are inescapable. Such circumstances point to the probability of development of high prevalence of anemias in near future and demands that due researches be done to assess the effect these psychological factors can make on the disease anemia. *Ayurveda* describes that such psychological factors affect the digestion, metabolism and assimilation processes occurring within the body.

The affliction of stress, fears and grief found in the thalassemic children was found to be an associated consequence of their disease process, life quality and the treatment procedure, rather than being a cause of the disease. These factors were also found to have a role in the causing haemolysis and increasing the transfusion requirement. Literature reports that the thalessemic

patients are continuously under oxidative stress due to both internal and external causes [20]. These factors of physical and psychological stress augment the process of oxidative stress and thus cause the requirement of early transfusion during such periods.

The aetiology about the sexual practices of the patients could not be elicited in the patients, probably due to the fact that most of the people coming to the hospital were conservative in nature and were thus reluctant to discuss this issue.

CONCLUSION

The form of aetiological factors as described in the ancient texts has changed very drastically today, especially in terms of diet, but the aetiological factors of *pandu roga* are found very significantly in the patients of anemias. Many of the scientific studies have proven their role and mechanism of action in the causation of these anemias. Thus, it is suggested that these factors should also be considered in the treatment process of these anemias and should be considered while planning the management of the anemias because avoidance of the aetiological factors is a major constituent of treatment and helps in resolving the pathogenesis of the disease and prevent recurrence and relapses in future.

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