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Original Research Article

Statistical Assessment of the Effectiveness of Homoeopathic Medicine *Ferrum metallicum* 6X in Increasing the Haemoglobin Concentration of Thirty Paediatric Iron Deficiency Anaemia Patients Using Paired 't' Test

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ABSTRACT

Iron deficiency anemia is one of the most prevalent micronutrient deficiencies in young children in India and other parts of the world. According to the National Family Health Survey (NIIFS-3) data the incidence of anemia in urban children is 71% and among rural it is 84%. When it persistent it can cause cognitive and motor delays leading to lower mental and psychomotor scores. In Homoeopathic system of medicine Ferrum metallicum is found to be a common and effective medicine in curing the Iron deficiency Anaemia. Thirty Paediatric Iron Deficiency Anaemia patients were taken up for the study and treated with Ferrum metallicum 6X for about three months. By the end this study showed an 80% Positive effect in increasing the Haemoglobin Concentration and the same is also proved statistically by means of Paired 't' Test.

Key Words: Homoeopathy, Iron deficiency anemia, Paediatric, *Ferrum metallicum.6X*

INTRODUCTION

According to the National Family Health Survey data the incidence of anemia in urban children is 71%, rural is 84% and overall is 79%. [1] The usual Indian diet contains inhibitors of absorption. Hence Indians are more prone to develop iron deficiency anemia. [2,3]

Anemia resulting from severe iron deficiency (IDA) is the most prevalent and widespread nutrition problem in infants and young children in the developing world and has proven very resistant to prevention through public health interventions. [4, 5]

IDA is one of the most prevalent micronutrient deficiencies in young children in India and other parts of the world, and it is with persistent cognitive and motor delays even after the anemia and iron deficit have been repaired. Madan, et al. reported recently that children aged 6-23 months with moderate to severe iron deficiency anemia had lower mental and psychomotor scores that persisted to as long as 19 years of age. These children also had lower scholastic achievement and needed more special education assistance than iron sufficient children. [6]

IDA is currently the most widespread micronutrient deficiency and affects nearly 1.5 billion people globally. Infants, preschool children, adolescents & women of child bearing age are at greatest risk of developing iron deficiency & its resultant anemia. [7] Preschool age and adolescents are particularly more vulnerable for IDA because of rapid somatic growth. In older children, the causes include inadequate intake, mal-absorption, infection, chronic blood loss & cow milk protein hypersensitivity. Rarely, in such errors of iron metabolism as sideroblastic anemia, idiopathic pulmonary haemosiderosis and congenital transferring deficiency, iron gets stored in the body rather than being utilized for erythropoiesis. [8]

Its frequency is related to certain basic aspects of iron metabolism and nutrition. The body of a newborn infant contains about 0.5 g of iron, whereas the adult content is estimated at 5 g. To make up for this discrepancy, an average of 0.8 mg of iron must be absorbed each day during the first 15 yr of life. In addition to this growth requirement, a small amount is necessary to balance normal losses of iron by shedding of cells. Accordingly, to maintain positive iron balance in childhood, about 1 mg of iron must be absorbed each day. [9]

Thus IDA being a common Health Problem of Children needs a prompt solution. In Homoeopathic system of medicine Ferrum metallicum is found as a common and effective medicine in curing the IDA in adults. This has been proven by various past studies and published literatures. The medicine Ferrum metallicum may also be considered for the Paediatric IDA patients. [10,11]

The above said details urged me to undergo a Research Project on the "statistical Assessment of the Effectiveness of Homoeopathic Medicine Ferrum Metallicum 6X in increasing the Haemoglobin Concentration of Thirty Paediatric Iron Deficiency Anaemia patients using Paired 't' test".

Aims & Objectives

- To determine the efficacy of Homoeopathic medicine Ferrum Metallicum 6X in increasing the Haemoglobin Concentration of 30 Paediatric Iron Deficiency Anaemia patients.
- Statistical assessment of the same using Paired 't' test.

MATERIALS & METHODS

Source of Data

Patients were collected from the college OPD and my private clinic situated in Salem.

Selection of Patients: Inclusion and Exclusion criteria were fixed for selection.

Inclusion Criteria

1. Diagnosed patients are of age 5 to 10 years
2. Cases were selected according to the Criteria for the Diagnosis - Haemoglobin Concentration <10.5 gms%.
3. Both male children and female children are taken for study.
4. Purposive sampling was done; sample size was 30 in number.

Exclusion criteria

1. Children with any other systemic illness.

Methodology used for the Study:

- All the cases were selected as per the inclusion and exclusion criteria.
- A total of 30 patients were included in the study after the drop outs were excluded.
- A detailed case history was taken as per the proforma prepared for the topic.
- Patients were reviewed every fortnightly and evaluations were done.
- Prognosis was evaluated according to the investigation results.
- Haemoglobin concentration was found by using “Shalis Adams Haemoglobinometer”.
- Homoeopathic medicine Ferrum metallicum 6X was prescribed in the form of 1 Grain tablets. 2 tablets per oral

route three times a day for three months were given to each patient.

- They were also advised to eat Iron Rich Food.
- All the cases were followed and monitored for a period of 3 months.
- The Haemoglobin Concentration of the patients before and after the prescription of Ferrum metallicum 6X are tested statistically by using Paired 't' Test.

OBSERVATION & RESULTS

Table 1: Age Distribution of Cases

S.No	Age Group (In Years)	Number of Patients	Percentage
1	5 - 6	7	23%
2	7 - 8	15	50%
3	9 – 10	8	27%

Table 2: Gender Distribution of Cases

S.No	Gender	Number of Patients	Percentage
1	Males	16	53%
2	Females	14	47%

Table 3: Distribution according to Treatment Outcome

S.No	Treatment Outcome	Number of Patients	Percentage
1	Improved	24	80%
2	Not Improved	6	20%

Statistical Analysis:

Null Hypothesis (H_0): Statistically there is no difference in the Haemoglobin concentration of Paediatric Iron deficiency Anaemia patients before and after administration of the Homoeopathic medicine Ferrum metallicum 6X.

Alternate Hypothesis (H_a): Statistically there exists a significant difference in the Haemoglobin concentration of Paediatric Iron deficiency Anaemia patients before and after administration of the Homoeopathic medicine Ferrum metallicum 6X.

$H_0: \mu_1 = \mu_2$ which is equivalent to test $H_0: \overline{D} = 0$
$H_a: \mu_1 < \mu_2$ (as we want to conclude that training has been effective)

Arithmetic Mean of 'D' = $\overline{D}$ = 0.8; Standard Deviation of 'D' = 0.52

$t = \frac{\overline{D} - 0}{\sigma_{diff}/\sqrt{n}}$ with $(n-1)$ degrees of freedom

$\overline{D}$ = Mean of differences

$\sigma_{diff.}$ = Standard deviation of differences
n = Number of matched pairs

Critical calculated 't' Value = $0.8 / 0.52/\sqrt{30} = 8.89$

Degree of freedom (n-1) = 30-1 = 29 & Level of significance: 5%

Tabulated t' Value for 29 Degree of freedom at 5% One tailed Level of significance= 1.699

Table 4: Descriptive Statistics (in gms%)

Hb%	Minimum	Maximum	Mean	Median	Std. Deviation	Confidence Interval @ 95% LOS
Before Treatment	7.60	10.40	8.953	9.0	0.70011	0.558 to 0.941
After Treatment	8.20	11.20	9.717	9.8	0.70958	0.565 to 0.954

Table 5: Inferential Statistical Steps

Case. No	Hb% Before Treatment in gms% (X^1)	Hb% After Treatment in gms% (Y^1)	Difference in gms% $D = Y^1 - X^1$	$D - \bar{D}$	$(D - \bar{D})^2$
1	08.2	10.0	1.8	1.8 - 0.8 = + 1.0	1.00
2	09.2	10.2	1.0	1.0 - 0.8 = + 0.2	0.04
3	09.0	09.0	0.0	0.0 - 0.8 = - 0.8	0.64
4	10.0	11.0	1.0	1.0 - 0.8 = + 0.2	0.04
5	09.0	10.2	1.2	1.2 - 0.8 = + 0.4	0.16
6	10.2	11.2	1.0	1.0 - 0.8 = + 0.2	0.04
7	09.2	10.0	0.8	0.8 - 0.8 = + 0.0	0.00
8	09.4	10.2	0.8	0.8 - 0.8 = + 0.0	0.00
9	10.0	10.5	0.5	0.5 - 0.8 = - 0.3	0.09
10	08.6	09.2	0.6	0.6 - 0.8 = - 0.2	0.04
11	08.6	09.4	0.8	0.8 - 0.8 = + 0.0	0.00
12	09.0	09.0	0.0	0.0 - 0.8 = - 0.8	0.64
13	09.0	08.6	-0.4	-0.4 - 0.8 = -1.2	1.44
14	08.2	09.6	1.4	1.4 - 0.8 = + 0.6	0.36
15	09.2	10.4	1.2	1.2 - 0.8 = + 0.4	0.16
16	08.6	09.2	0.6	0.6 - 0.8 = - 0.2	0.04
17	07.6	08.6	1.0	1.0 - 0.8 = + 0.2	0.04
18	10.0	10.4	0.4	0.4 - 0.8 = - 0.4	0.16
19	09.0	10.0	1.0	1.0 - 0.8 = + 0.2	0.04
20	08.0	09.2	1.2	1.2 - 0.8 = + 0.4	0.16
21	09.0	10.0	1.0	1.0 - 0.8 = + 0.2	0.04
22	08.0	08.2	0.2	0.2 - 0.8 = - 0.6	0.36
23	10.4	10.2	-0.2	-0.2 - 0.8 = -1.0	1.00
24	09.2	10.2	1.0	1.0 - 0.8 = + 0.2	0.04
25	09.4	09.2	-0.2	-0.2 - 0.8 = -1.0	1.00
26	08.0	09.2	1.2	1.2 - 0.8 = + 0.4	0.16
27	08.6	09.4	0.8	0.8 - 0.8 = + 0.0	0.00
28	09.0	10.2	1.2	1.2 - 0.8 = + 0.4	0.16
29	08.6	09.6	1.0	1.0 - 0.8 = + 0.2	0.04
30	08.4	09.4	1.0	1.0 - 0.8 = + 0.2	0.04
			$\sum D = 22.9$		$\sum (D - \bar{D})^2 = 7.93$
			$\bar{D} = 0.8$		

Comparison of Critical and Tabulated Values:

Calculated 't' Value is exceeding the Tabulated 't' Value.ie - The Critical calculated 't' value 8.89 is significantly exceeding the tabulated 't' value 1.699

Testing of Hypothesis:

So the Null hypothesis is rejected and the alternate hypothesis is accepted at 5% Level of Significance i.e. Statistically there exists a significant difference in the Haemoglobin concentration of Paediatric IDA patients before and after administration of the Homoeopathic medicine Ferrum metallicum 6X. So we can accept that the differences between the groups are statistically significant and this is not due to any chance. Since the *p Value calculated is < 0.0001*, the modulation is highly significant. [12-14]

DISCUSSION

Thirty clinically diagnosed Paediatric cases of IDA were taken up for the study. The patients were from the age group of 5 years to 10 years. Cases mostly belonged to low socio economic group. The parents in most of the cases were illiterate and ignorant. A detailed case history with the proper clinical examination was done in all the patients. They were given advice about the importance of taking iron enriched diet.

The study showed the commonly affected patients (50%) were between the ages of 7 - 8 years. 53% of Children were males and 47% were females. Improvement was found in 24 cases (80%) and no improvement in 6 cases (20%).

Statistically there existed a significant increase in the Haemoglobin concentration of Paediatric IDA patients before and after administration of the Homoeopathic medicine Ferrum metallicum 6X which was proved with *p Value <0.0001*.

CONCLUSION

Thus by using the Homoeopathic medicine Ferrum metallicum 6X the Haemoglobin concentration of IDA affected children can be increased by which the Disease load in the common population may be controlled effectively.

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