REFERENCE ID: STSH180243

EVALUATION OF PULMONARY FUNCTIONS IN FERTILE FEMALES HAVING ANEMIA WITH HOMOEOPATHIC SIMILIMUM

1. INTRODUCTION

WHO defines anemia as "Anemia is a condition in which the number of RBC (or) their oxygen carrying capacity is insufficient to meet the physiological needs, which vary by age, sex, altitude, smoking and pregnancy state.[40]In 1830's anemia and lack of iron in blood was detected by Hoeffer, Popp and Fredrich and Ashwell classified it as disease of blood.[11]Anemia is caused by decreased production of RBC, increased destruction of RBC, excess loss of blood, dietary deficiency, malabsorption, inherited disorder, autoimmune disorder, bone marrow disorders, hormone disorder, due to drugs and medications, infection, period of rapid growth or high energy requirement.[38]Anemia is classified as mild , moderate and severe based on the level of concentration of Haemoglobin (Hb) in blood. Mild anemia accounts for about 10.0-11.9 g/dl, moderate anemia with Hb 7.0-9.8g/dl, severe with Hb less than 7.0g/dl.[27]

1.1. ANEMIA -A "SILENT KILLER" IN INDIA

Usually women have lowered Haemoglobin level than Men.[31]In women it is seen more frequently in reproductive age group. Globally, anemia affects 1.62 billion people, which corresponds to 24.8% of the population. However, the population group with the greatest number of anemics are non pregnant women.[35]In India 90% of the females of reproductive age group have been reported to be anemic. The common cause being iron deficiency.[32]The normal daily loss of iron is 1mg.A regular loss of 2ml of blood per day doubles the iron requirement. During menstruation 35ml of blood is lost.[05]On average, an additional 20mg of iron is lost during menstruation, so
Pre menopausal women requires about twice as much iron as men.[07]

As said earlier 90% of Indian women suffer from iron deficiency despite having proper meal.[08]This may be due to increased tea intake in India which holds close to second place in tea consumption next to turkey.[25]But the prevalence of iron deficiency anemia in Turkey is only about 56%[16]which directs to the increased meat consumption. There are two types of iron, haem iron and non haem iron.[05]Non haem iron is found in

cereals and vegetables which is poorly absorbed compared to well absorbed hem iron from animal products.[10]In India 38% of the total populations are Vegans[36] who consume more of non haem iron. The tannin which is found in tea reduces the iron absorption. Dietary calcium reduces iron uptake from the same meal, which may precipitate iron deficiency. [10]But the fruits and vegetables containing Vitamin C enhances iron absorption, it may help reduce the risk of anemia among people prone to iron deficiency.[33]But consuming Vitamin C above 2000mg may lead to severe complications like formation of renal calculi and digestive distress It may also lead to iron overload in people with hemochromatosis.[17]

1.2. HAEMOGLOBIN: THE CORE COMPONENT OF RBC

The main component of RBC is haemoglobin, which carries oxygen from the Lungs to the tissues. Iron is important for the formation of haemoglobin. The primary feature of Hb is it's ability to combine loosely and reversibly with Oxygen (O_2) in the lungs and then to release this O_2 readily to tissues.[03]O_2 which is the only abundant single element which makes up to 65% of human body mass.[18] The Haemoglobin molecule consists of an iron-containing pigment portion haem which consists of the pigment called porphyrin that combines with iron.[12]So one finds four iron atoms in each haemoglobin molecule. These four iron combines with four molecules of oxygen which is just oxygenated but not oxidized.[09]This Haemoglobin is called oxygenated Haemoglobin.

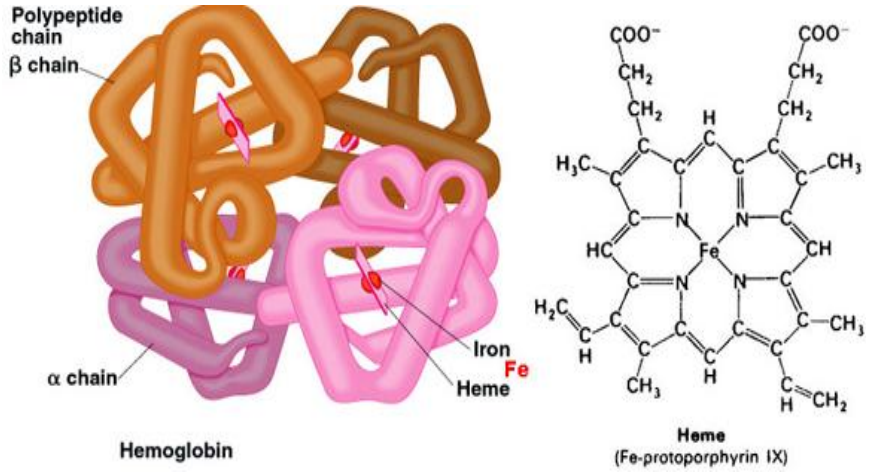


FIG 1. STRUCTURE OF HAEMOGLOBIN

1.3. RELATION BETWEEN RESPIRATORY SYSTEM AND ANEMIA

The primary function of respiratory system is to exchange O_2 and CO_2.The body's circulatory system is an essential link between the atmosphere which contains O_2 and the cells of the body, which consumes O_2 which is primarily done by haemoglobin of RBC[26].But in anemic individuals due to lack of Hb there is ineffective O_2 delivery to the exercising muscles, with a resultant increase in anaerobic metabolism.[06]Many times respiratory and circulatory symptoms are only noticeable following exertion. When anemia is severe, dypsnoea and awareness of vigorous heart action may be noted even at rest. The rate and depth of respiration often are increased. The minute ventilation is increased, as is the residual air, but the $FEV_1$is reduced. The O_2 debt incurred during a standard work load was greater in anemic subjects. In anemic condition, it took longer to restore heart rate and respiratory minute volume. The recovery period for O_2 uptake was prolonged than CO_2 uptake in exercise as it attributed to the greater work required of the respiratory muscles.[11]

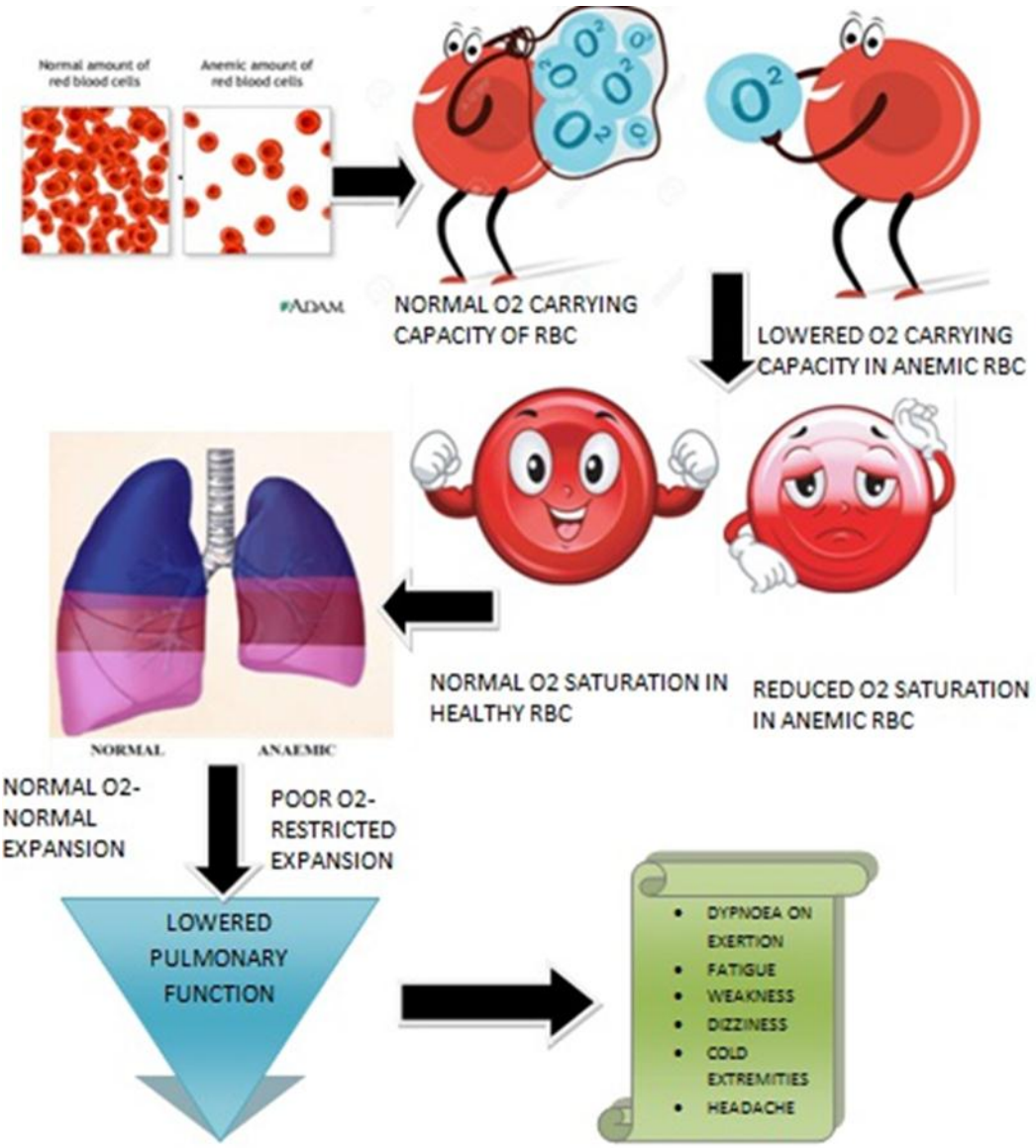
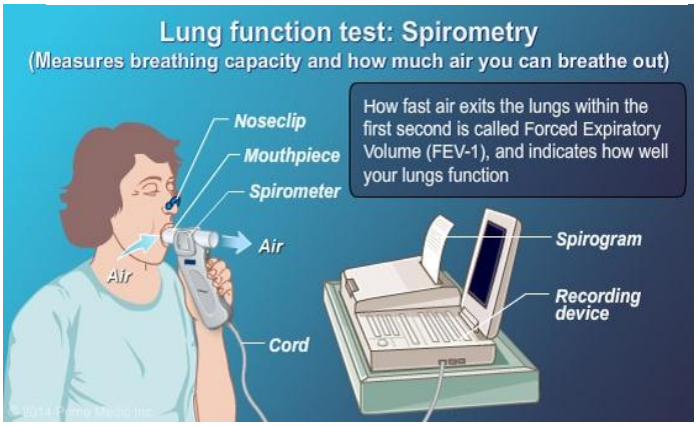


FIG 2 . RELATIONSHIP BETWEEN ANEMIA AND PULMONARY FUNCTIONS COMPAILED BY THE RESEARCHER WITH THE KNOWLEDGE GAINED DURING THE STUDY

1.4. SPIROMETRY: THE KEY PROCEDURE

FIG 3. SPIROMETRY



Spirometry is a standard test used to measure how well your lungs are functioning. The test works by measuring airflow into and out of your lungs. By using spirometry two key

factors such as Forced vital capacity (FVC) and Forced Expiratory Volume (FEV) can be measured.[20]FEV is the amount of air that can be forced out of the lungs.FEV_1 helps to evaluate the severity of breathing problems, which is common in anemic subjects. The flow volume loop displays airflow as it relates to lung volume during maximum inspiration and expiration. The FEV expressed as percentage of FVC is an excellent measure of airflow limitation. In normal subjects it is around 75%.[37] The principle advantage of the flow volume loop is it can show whether airflow is appropriate for a particular lung volume.[10]

1.5. SIGNS AND SYMPTOMS OF ANEMIA

The common symptoms include fatigue, weakness, pale or yellow skin, irregular heartbeat , dyspnoea, angina, cold hands and feet, headache, breathlessness, intermittent claudication and palpitation.[39]The signs include pallor, tachycardia, systolic flow murmur, cardiac failure[05]. The signs of iron deficiency anemia does not occur till the stores have been completely depleted.[04]The signs also include brittle nails, koilonychia, atrophy of the papillae of tongue, angular stomatitis, brittle hair, plummer-vinson syndrome and pica.[05]Sutle disturbances of function of many organs can be detected.[04]

FIG 4. SIGNS AND SYMPTOMS OF ANEMIA

Anemic Hypoxia is a condition in which arterial PO_2 is normal but the amount of Hb available to carry O_2 is reduced. A sudden drop in inspired PO_2 to less than 20 mmHg causes loss of consciousness and death in 4-5 min. Less severe hypoxia causes a variety of mental abrasion like impaired judgment, excitement, disorientation, loss of sense and headache.[15]Pulse-oximetry is a non invasive and painless test that measures your oxygen level in blood. It can rapidly detect even small change in how efficient oxygen is being carried to the extremities furthest from heart.[22]

2. NEED OF THE STUDY

Anemia is a very common condition seen in 90% of Indian women. While explaining the background, it is inevitable to say that most of the young girls are anemic. Though is being an extremely common phenomenon it is given least importance. But if the anemia is left untreated it may cause adverse effects in the health of the individual. It can even cause a cardiac arrest and may lead to death of the individual. Less severe hypoxia causes variety of mental abrasion like impaired judgment, excitement, disorientation, loss of sense and headache. [15]One survey showed that 20%-40% of maternal mortality rate in India is due to anemia.[28]One of the most common symptom said by anemic subjects is dyspnoea on exertion. Even walking for few distances or climbing a small slope or ascending few stairs causes dyspnoea which makes them sit and rest so that they feel embarrassed. There are different types of anemia, the common being iron deficiency. The common measure taken against iron deficiency is the supplementation of ferrum orally or through IV. But researches have shown that the iron supplementation programmes are not effective in India In this scenario, considering Homoeopathy as a system of treatment has certain advantage on curing anemia. For effective treatment using Homoeopathy, Constitutional medicines are said to be of high value. This study was done with the intention to bring out the possible correlation between anemia and altered Pulmonary function in females of reproductive age group and thereby exploring the scope of potentized homoeopathic medicines to cure anemia so that the pulmonary function would enhance and therefore the general Quality of Life (QOL) of the individual could be improved.

3. AIM AND OBJECTIVES

AIM

- Usefulness of Homoeopathy in treating anemia with decreased pulmonary function in fertile women.

OBJECTIVE

- Increasing the Pulmonary function of patients by treating with similimum.
- To assess the co-relation between different stages of anemia with the Forced Expiratory Volume.
- To assess the severity of anemia on the basis of Hb concentration and FEV_1 Values

4. REVIEW OF LITERATURE

4.1. RELATIONSHIP OF HAEMOGLOIN AND FEV_1 IN COPD

According to the investigation upheld by Mi-Hyekim, Yong-Hwan Kim, et all in the year 2018 on" Relationship of serum Iron Parameters and Hemoglobin with Forced Expiratory Volume in 1 second in patients with Chronic Obstructive Pulmonary Disease" finalized that the $FEV_1$was positively correlated with serum hemoglobin, iron, transferring saturation and ferritin and negatively with age.

4.2. IRON STATUS AND LUNG FUNCTION IN US WOMEN

According to a project conducted by Emily P.Brigham, Meredith c, et all on the topic "Iron Status is associated with Asthma and Lung Functions in US Women" by 2015 FEB 17,concluded that the iron status may play a role in asthma and lung function in US Women.

4.3. PULMONARY FUNCTION AND ANEMIA

According to the study conducted by Sharad Jain and JL Agarwal at Sarawathi Institute of Medical Sciences, Hapur, U.P, India by 2014 on "Pulmonary function assessment in young female medical students suffering from anemia" suggests that Forced Vital Capacity (FVC), Peak Expiratory Flow Rate(PEFR),FEV_1 and Maximum Voluntary Ventilation(MVV) in anemic group subjects were significantly lower in comparison to control group and they have concluded that Anemia leads to decreased pulmonary functions which further hampers the oxygenation of the tissues and may worsen the physical and mental capabilities.

4.4. ANEMIA AND RESTRICTIVE LUNG DISEASE

According to the work undertaken by K Amrutha Kumari, T Rama Kranthi, et all at Dr.V.R.K. Women's Medical College Teaching Hospital and Research Centre, Azinagar, Telungana, India by 2014 concluded that the decrease in FVC and FEV_1 in iron deficiency

anemia suggested a restrictive pulmonary impairment even though the values are not statistically significant.Increase in FEV_1/FVC indicates restrictive broncho pulmonary dysfunction. Decrease in PEFR could be due to weakness of respiratory muscles.

4.5. LUNG FUNCTION ABNORMALITIES AND SICKLE CELL ANEMIA

According to a study conducted by Edward J.Van Beers, Mart N. Van der Plas, et all in August 2014 on "Exercise Tolerance, lung function abnormalities, anemia and cardiothoracic ratio in sickle cell patients" concluded that Peak Oxygen uptake was decreased in 83% of patients and a strong correlation between various parameters of lung volume and cardiothoracic ratio was found out and they hypothesized that cardiomegaly and relatively small chest size may be important carrier of impairment in pulmonary function

4.6. IRON DEFICIENCYANEMIA AND PULMONARY FUNCTION

According to a test upheld by Dutt SN; Yeshwanth M,et all at St.John's Medical College and Hospital, Bangalore, India by 1994 on "Effect of iron deficiency anemia on Pulmonary function in children" says that the 234 children who were suffering from anemia after iron therapy had improvement in PEFR and have concluded that mild to moderate iron deficiency anemia in children can adversely affect the lung functions.

4.7. HAEMOGLOBIN AND D_{LCO}

According to a research conducted by Medizinischeklinik, Kiel, et all in 1985 on "Effect of low haemoglobin levels on the Diffuse Capacity of the Lungs for CO" concluded that the true maximum diffusing capacity of the lungs measured in anemic patients was too low and there was a positive linear correlation between the hemoglobin content of the blood and D_{LCO}.

4.8. IRON DEFICIENCY AND RESPIRATORY FUNCTION

According to the experiment done by Lynda Blaynew, Royston Baiely wood, et all in 1977 at Wales on "Effect of Iron Deficiency on the Respiratory function and Cytochrome content of Rat Heart Mitochondria" concluded that iron deficiency is associated with impairment of myocardial mitochondrial electron transport. They also concluded that iron deficiency is associated with impairment of normal growth and relative cardiac hypertrophy in iron deficient rats.

4.9. RESPIRATORY FUNCTION AND IRON DEFICIENCY ANANEMIA

According to a work conducted by Osmanliev P, *et al.*, 1975 on "Respiratory function in iron deficiency anemia before and after treatment and have considered basic ventilator indices, arterial blood gases, indices of the acid-base balance and the indices of the alveolar-

capillary diffusion(DLCO, SS, Dm, theta Vc) and have found out a substantial changes after treatment mainly in DLCO,SS and theta Vc.

4.10. **IRON DEFICIENCY ANEMIA AND AEROBIC POWER**

According to an assessment held by CTH Davies,AC Chykweumeka *et al* in 1973 on "Iron deficiency anemia:its effect on maximum aerobic power and response to exercise in African Males ages 17-40 years" concluded that anemia impairs performance during moderate and near maximum exercise and there is an associated rise of cardiac output and plasma volumes.

4.11. **ANEMIA AND LUNG FUNCTION**

According to a research conducted by Jian Guo, Cong Zheng, *et al*. on "Impact of anemia on lung function and exercise capacity in patients with stable severe chronic Obstructive Pulmonary Disease which shows decrease in amplitude of Hb levels is related to the quantity of Oxygen uptake.

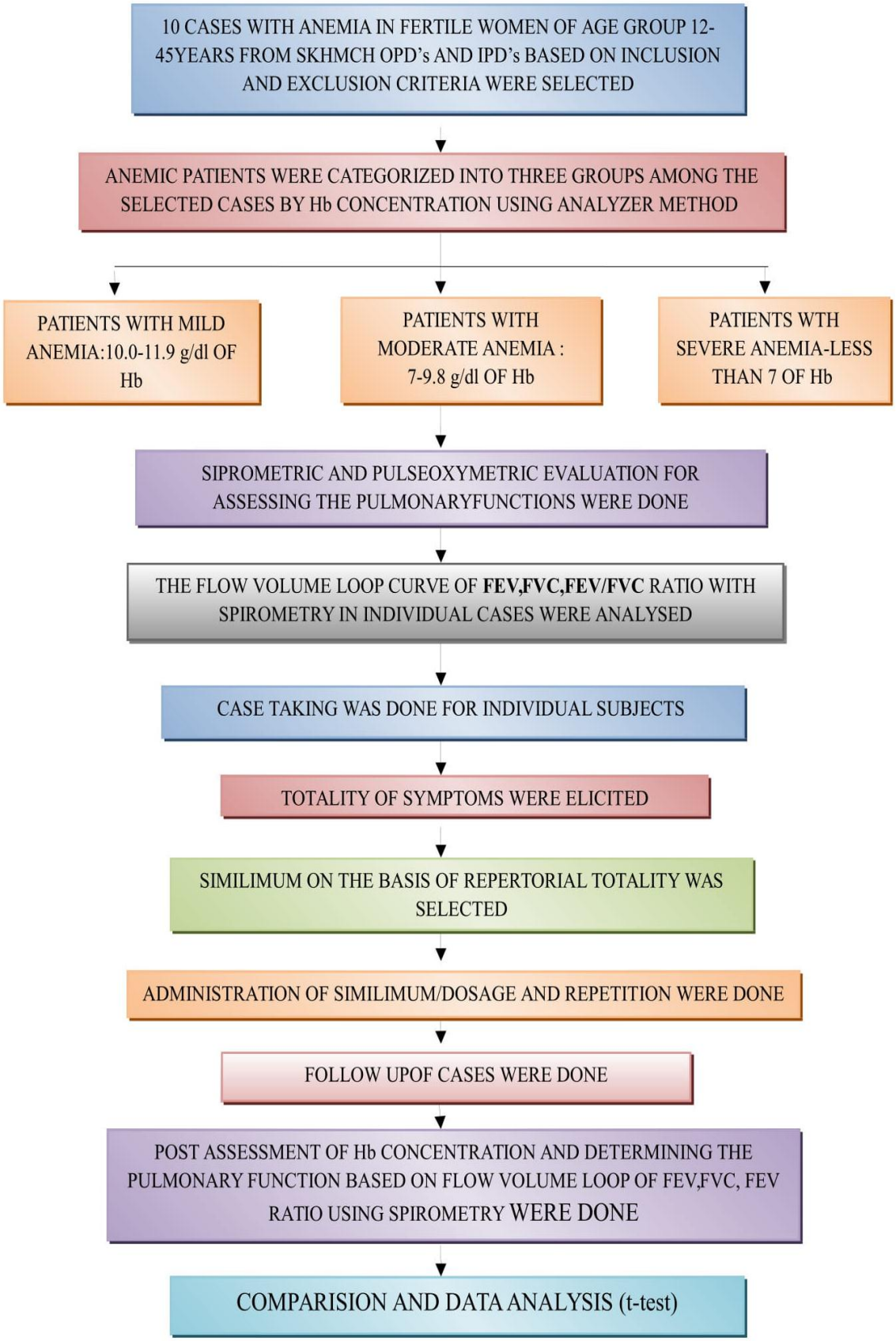
4.12. **PULSE-OXIMETRY AND SEVERE ANEMIA**

According to a study conducted by Hinkelbein J, Osika A, *et al.* on "Accuracy of Pulse-oximetry in a case of severe anemia from gastrointestinal hemorrhage" concluded that a good correlation was found between Oxygen saturation and Haemoglobin.

4.13. ANEMIA AND HOMOEOPATHY

According to a work done by Mamatha A Gundimi, on "The impact of Homoeopathic Remedies on Clinical Pattern and the Haematological changes of iron deficiency Anemia in adult age group" concluded that Pulsatilla was the most indicated drug and constitutional medicines were effective in the treatment of IDA.

5. METHODOLOGY IN BRIEF



6. METHODLOGY

6.1. STUDY SETTING: A Sample of 10 cases was taken from the patients presenting with anemia without any previous respiratory diseases or with any other chronic diseases visiting the OPD's, IPD's of Sarada Krishna Homoeopathic Medical College Hospital.

Detailed case taking was done and recorded in accordance with SKHMCH standardized chronic case record format. Symptom analysis has been done and remedies were selected after proper reportorial approaches were prescribed by considering the patient as a whole with their perfect similimum.

Follow up analysis, repetition, dosage was also done as per the directions of 5^{th} and 6^{th} edition of Organon of medicine.

6.2. RESEARCH DESIGN:

- ❖ Single group, experimental, before and after study without control group
- ❖ To establish the co-relation between Anemia and decreased pulmonary function and to show the efficacy of homoeopathic similimum in improving anemia and pulmonary functions.
- ❖ Study was carried out at Sarada Krishna Homoeopathic Medical College Hospital.
- ❖ Data was collected according to Pre-structured SKHMCH case record in the presence of medical officer.
- ❖ Case taking along with physical examination and required investigation was done for the required patients.
- ❖ Results was subjected to statistical analysis and hypothesis was tested using unpaired 't –test'

6.3. SAMPLE DESIGN

- **Sample Size**: 10 cases
- **Sample Design**: Stratified Sampling
- Selected all the cases who have visited the OPD's and IPD's of SKHMCH that presents with signs and symptoms related to anemia without any previous COPDs

6.4. CRITERIA:

- ✓ INCLUSION CRITERIA:
  - 12 YEARS – 45 YEARS; Females

- Fertile Women
- Patients of different OPD's and IPD's of SKHMCH

✓ EXCLUSION CRITERIA:

- Girls before puberty and women in menopause
- Women with long term amenorrhea
- Pregnant females
- Patients with Cardiovascular diseases
- Patients with psychiatric illness and other chronic illness

6.5. <u>INTERVENTION:</u>

- Case taking and medicine selection and administration is done according to homoeopathic principle.
- Prescription was done based on the symptom similarity of the patient
- Detection of any change in the wrong direction was immediately followed by change in potency/change in remedy, depending on the response of the patient.
- General supportive care was also given to patients like iron rich diet, lifestyle modifications, etc.
- Pre and post treatment analysis was done using Hb concentration test and spirometry.

6.6<u>. DATA COLLECTION</u>:

→ A Brief case study was done on randomly selected anemic patients

→ Case taking was based on the directions given in Organon of Medicine.

→ Data was collected from different OPD's and IPD's of SKHMC with a pre-structural SKHMC case sheet.

→ Remedy selection was based on Repertorial approach and with authorized Homoeopathic Materia Medica.

6.7. <u>PROCEDURE:</u>

- 10 Cases with anemia, randomly selected based on inclusion and exclusion criteria.
- The patients were categorized into Mild, Moderate and Severe anemic based on their Hb concentration.
- Their pulmonary function was measured using Spirometry and Oxygen saturation is assessed using pulse-oximetry.

- The pulmonary parameter in spirometry results are analyzed for individual cases.
- Brief case taking was done and Totality of Symptoms was elicited
- Similimum was selected based on reportorial totality and authorized Homeopathic Materia Medica.
- The potency, Dose and repetition was done according to principles of Organon of Medicine
- The case was followed up for a minimum of 4 weeks.
- After 4 weeks again Hb concentration was assessed and any changes in the spirometry parameters were monitored and Oxygen saturation is assessed using Pulse-oximetry.

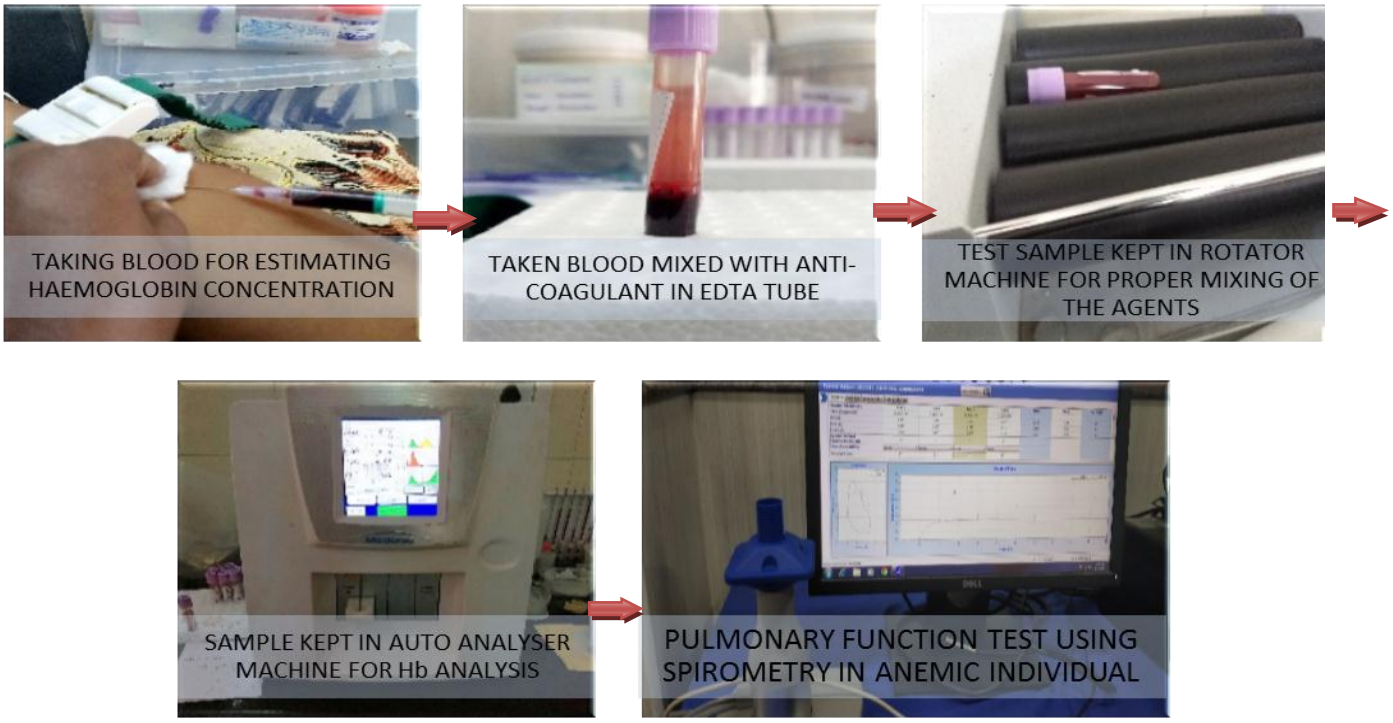


FIG 5 : PICTORIAL REPRESENTATION OF METHODOLOGY

6.8. SELECTION OF TOOLS:

- Analyzer method for detection of Hb concentration in blood
- Spirometry to assess the pulmonary function
- Pulse-oximetry to measure the Oxygen saturation
- Pre structural SKHMCH case format

6.9. STATISTICAL TECHNIQUE AND DATA ANALYSIS

Used simple percentage analysis,'t' test and correlation analysis. Data were represented in charts and tables for comparison and interpretation.

6.10.ETHICAL ISSUE:

Ethical clearance was obtained from the ethical committee of SKHMC before the commencement of the research.

6.11. SCOPE OF THE STUDY:

- ✓ To improve the Hb level using Homoeopathic similimum, thereby increasing the pulmonary function which could enhance the daily day to day routine work of females without any hindrance.
- ✓ To establish any relation between anemia and disturbed pulmonary function.
- ✓ To bring the role of anemia in causing respiratory disturbances without any COPD's.

7. IMPLICATION:

- ➢ To study the possible co-relation between anemia and pulmonary functions.
- ➢ To substantiate the role of Homeopathy in treating anemia and improving their pulmonary function.
- ➢ To give a better remedy for pulmonary complaints associated with anemia in young females**.**

8. RESULT:

Data was collected from patients by interviewing them and after laboratory investigation for Hb concentration. Then they were categorized according to their severity of anemia.PFT was performed to assess their lung volumes. Most suitable similimum was selected for each patient after referring to the repertory and Materia medica. Follow ups were watched and interpreted as per the criteria set up in each case. Then again Hb concentration and PFT was performed. Changes in each case were analyzed based on improvement after treatment. 't' test was applied for statistical analysis.

OBSERVATION AND RESULT:

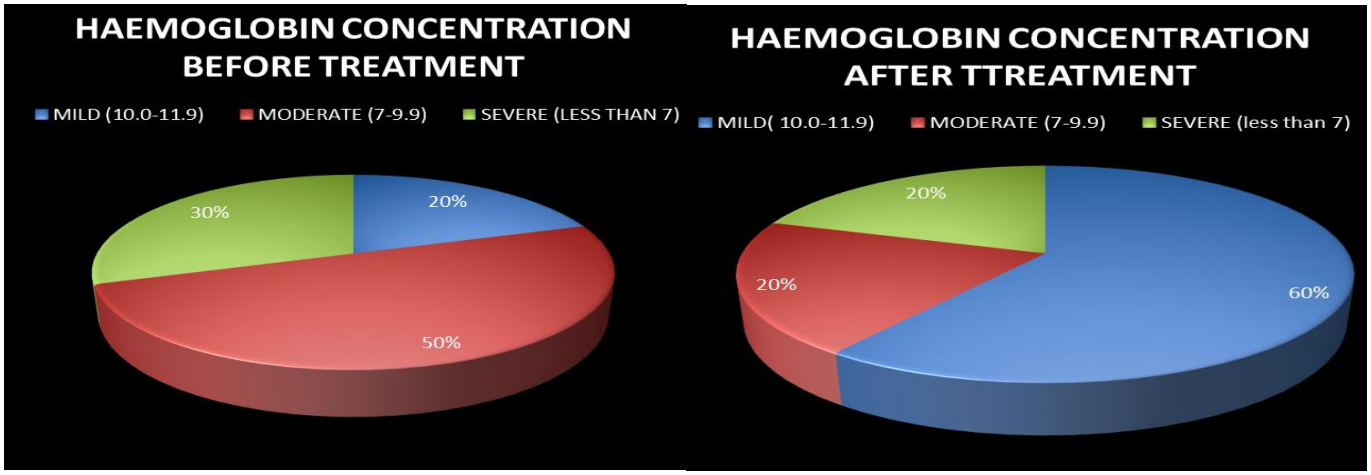
A sample of 10 cases attending the Outpatient Department and Inpatient Department of Sarada Krishna Homoeopathic Medical College Hospital were taken randomly for the study. All the cases were followed up to a minimum of 4 weeks and were considered for statistical study. The results are presented on the basis of data obtained from the study group.

TABLE 1:

DISTRIBUTION OF CASE ACCORDING TO HAEMOGLOBIN CONCENTRATION BEFORE TREATMENT

PULMONARY FUNCTION	BEFORE TREATMENT	AFTER TREATMENT
SEVERITY OF ANEMIA	NO OF CASES	NO OF CASES
MILD (10.0-11.9)	2	6
MODERATE (7-9.9)	5	2
SEVERE (less than 7)	3	2

CHART 1



Interpretation:

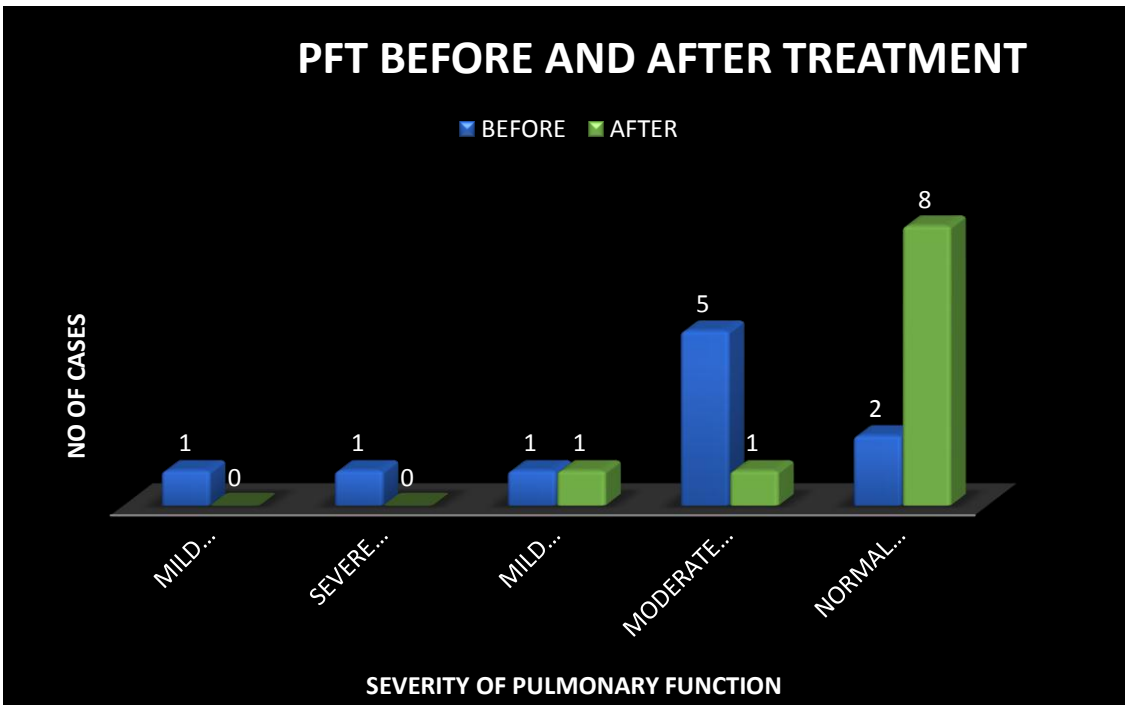
In 10 cases, 3(30%) of them had severe anemia,5(50%) of them suffered from moderate anemia and 2(20%) of them had mild anemia. After treatment with Homoeopathic Similimum, 6(60%) of them have mild anemia, 2 (20%) have moderate anemia and 2(20%) have severe anemia.

TABLE 2

COMPARISION OF PULMONARY FUNCTION BEFORE AND AFTER TREATMENT

PULMONARY FUNCTION	BEFORE TREATMENT	AFTER TREATMENT
MILD OBSTRUCTION (FEV1- 70%)	1	0
SEVERE OBSTRUCTION (FEV1 35%-50%)	1	0
MILD RESTRICTION (FVC-70%-80%)	1	1
MODERATE RESTRICTION (FVC-60%-70%)	5	1
NORMAL VENTILATORY FUNCTION (ABOVE 80%)	2	8

CHART 2



Interpretation:

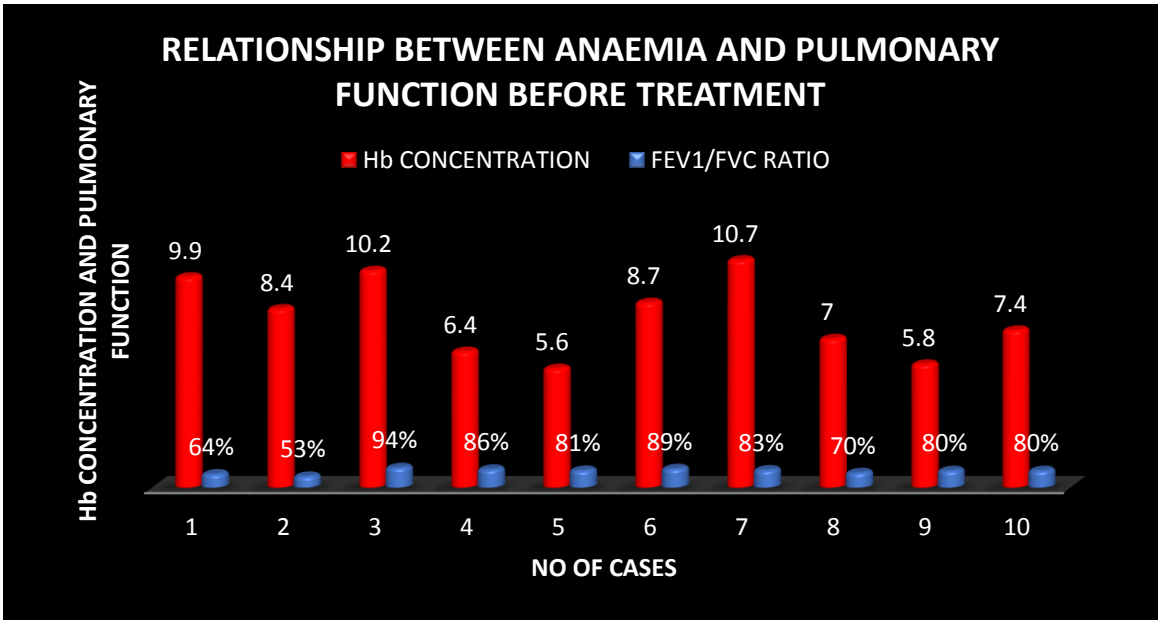
In 10 Cases, 1(10%) showed Mild obstruction,1(10%) showed Severe obstruction,1(10%) showed mild restriction; 5(50%) showed Moderate Restriction, 2 (20%) showed Normal ventilatory function before the commencement of treatment. After treatment with Homoeopathic similimum for nearly 1 month there was no obstructive diseases instead 1(10%) showed Mild restriction,1(10%) showed moderate restriction and 8(80%) showed Normal ventilatory function.

TABLE 3

RELATIONSHIP BETWEEN ANEMIA AND PULMONARY FUNCTION BEFORE TREATMENT

Sl No	Hb concentration	Spirometry value (FEV1/FVC ratio)
1	9.9	64%
2	8.4	53%
3	10.2	94%
4	6.4	86%
5	5.6	81%
6	6.7	89%
7	10.7	83%
8	7	70%
9	5.8	80%
10	7.4	80%

CHART 3



Interpretation:

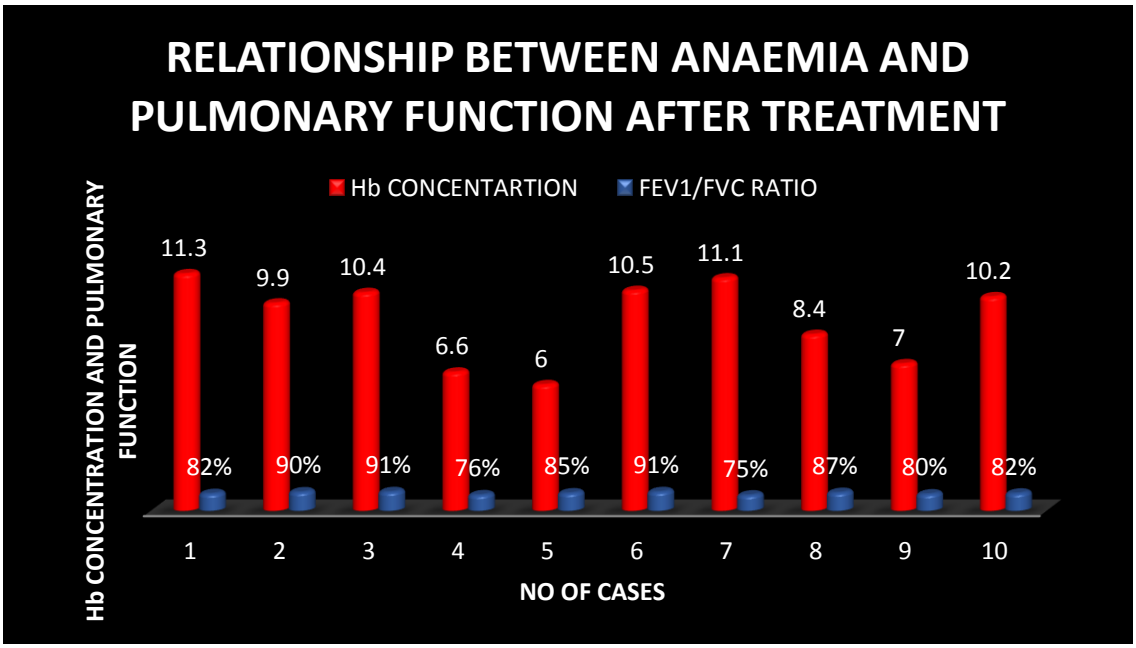
In 10 cases, 3(30%) who had severe anemia had their FEV_1/FVC ratio between 80%-90%, 5 (50%) who had moderate anemia had their FEV_1/FVC ratio between 50%-80% and 2(20%) who had mild anemia had their FEV_1/FVC ratio between 80%-90%.

TABLE 4

RELATIONSHIP BETWEEN ANEMIA AND PULMONARY FUNCTION AFTER TREATMENT

Sl no	Hb concentration	Spirometry values(FEV1/FVC)
1	11.3	82%
2	9.9	90%
3	10.4	91%
4	6.6	76%
5	6	85%
6	10.5	91%
7	11.1	75%
8	8.4	87%
9	7	80%
10	10.2	82%

CHART 4



Interpretation:

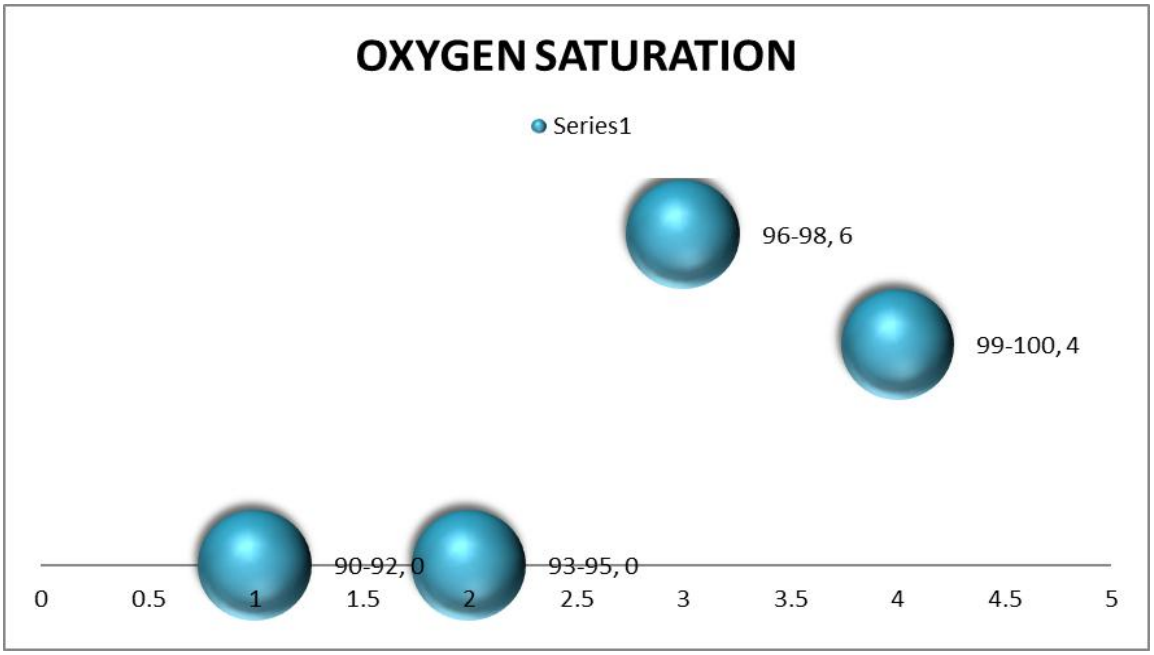
In 10 cases, 2(20%) who have severe anemia have their FEV_1/FVC ratio between 75%-85%, 2(20%) who have moderate anemia have their FEV_1/FVC ratio between 80%-90%, 6 (60%) who have mild anemia have their FEV_1/FVC ratio between 75%-95%.

TABLE 5

DISTRIBUTION OF CASE ACCORDING TO AMOUNT OF OXYGEN SATURATED

AMOUNT OF OXYGEN SATURATION	NO OF CASES
90-92	0
93-95	0
96-98	6
99-100	4

CHART 5



Interpretation:

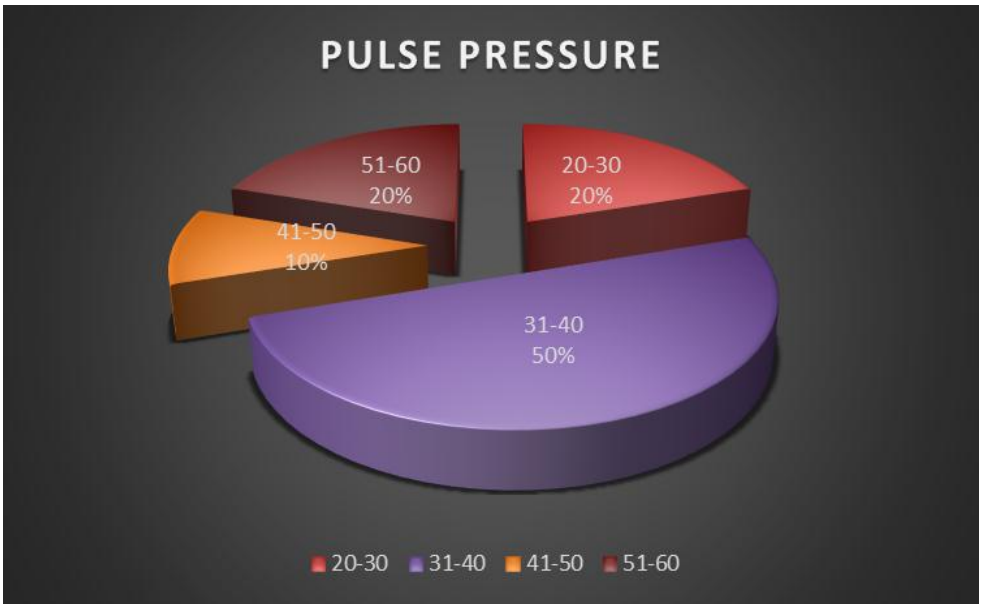
In 10 cases, 6(60%) have saturated oxygen at a range of 96-98/min and 4(40%) had oxygen saturation at a range of 99-100/min.

TABLE 6

DISTRIBUTION OF CASES ACCORDING TO PULSE PRESSURE

PULSE PRESSURE mm/Hg	NO OF CASES
20-30	2
31-40	5
41-50	1
51-60	2

CHART 6



Interpretation:

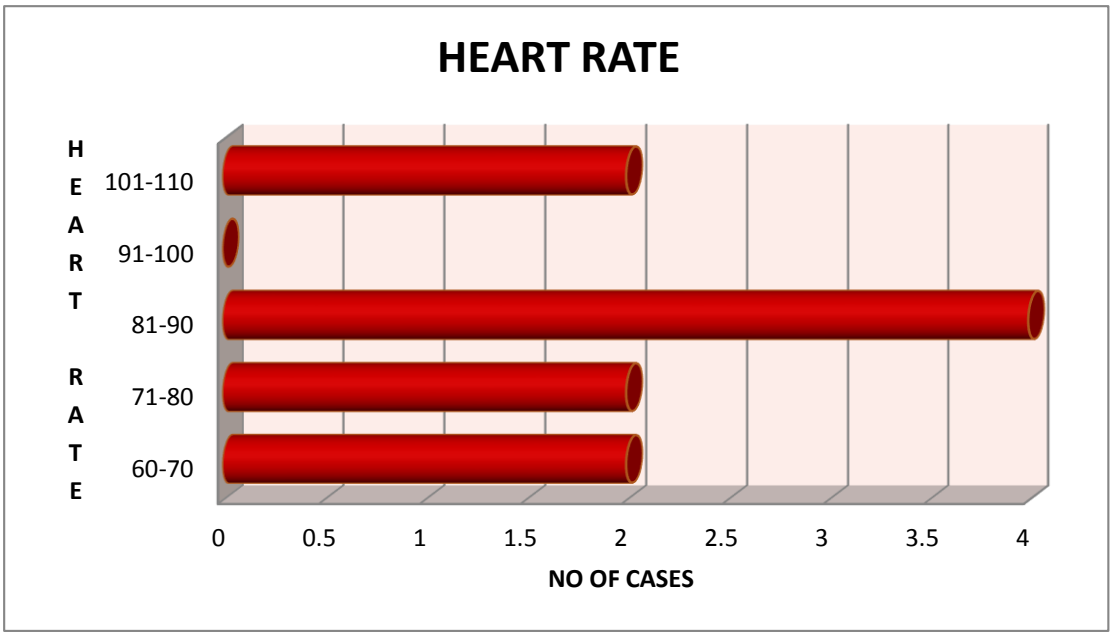
In 10 cases, 2(20%) had pulse pressure ranging between 20 -30,5(50%) had range between 31-40,1(10%) had range between 41-50 and 2(20%) had range between 51-60.

TABLE 7:

DISTRIBUTION OF CASE ACCORDING TO HEART RATE/MIN

HEART RATE/MIN	NO OF CASES
60-70	2
71-80	2
81-90	4
91-100	0
101-110	2

CHART - 7



Interpretation:

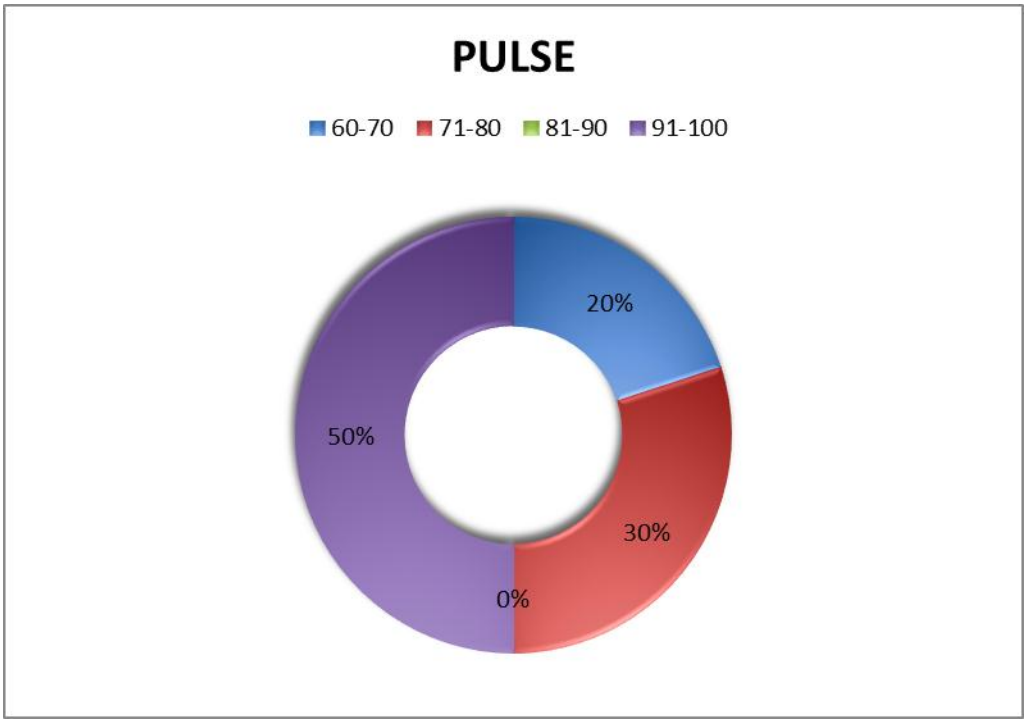
In 10 cases, 2(20%) had Heart rate measuring between 60-70 beats/min,2 (20%) of them had heart rate measuring between 71-80/min,4(40%) had heart rate at a range of 81-90/min and2(20%) had heart rate at a range of 100-110/min.

TABLE 8

DISTRIBUTION OF CASE ACCODING TO PULSE RATE/MIN

PULSE RATE/MIN	NO OF CASES
60-70	2
71-80	3
81-90	0
91-100	5

CHART 8



Interpretation:

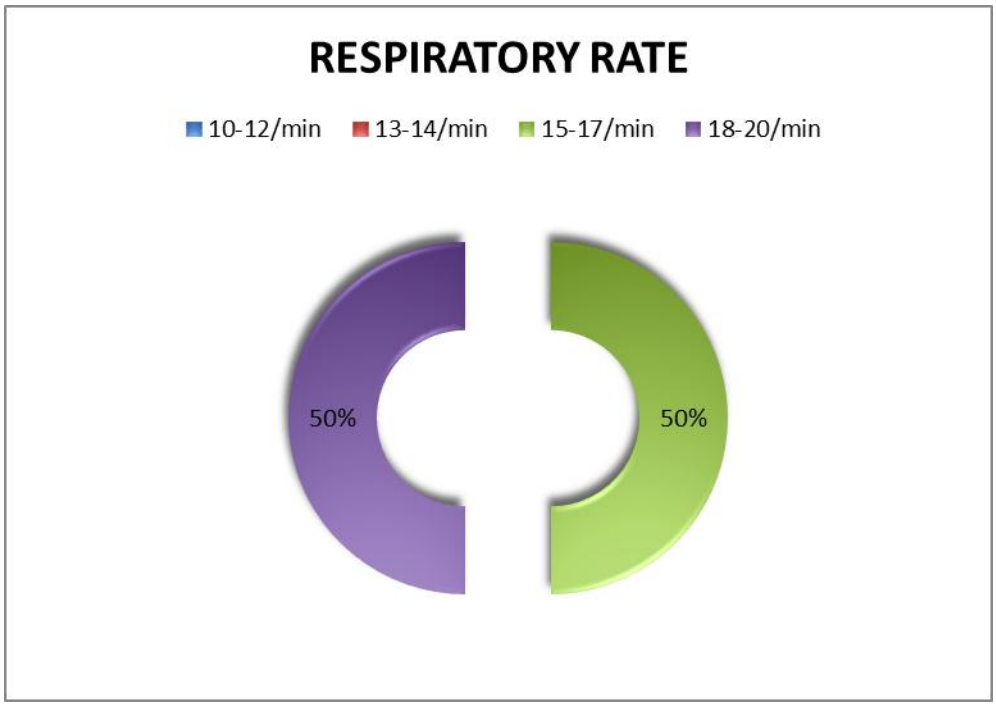
In 10 Cases, 2(20%) of them had their pulse ranging between 60-70 beats/min, 3(30%) of them had pulse ranging between 71-80/min and 5(50%) of them had pulse ranging between 91-100/min.

TABLE 9

DISTRIBUTION OF CASE ACCORDING TO RESPIRATORY RATE/MIN

RESPIRATORY RATE/MIN	NO OF CASES
10-12/min	0
13-14/min	0
15-17/min	5
18-20/min	5

CHART 9



Interpretation:

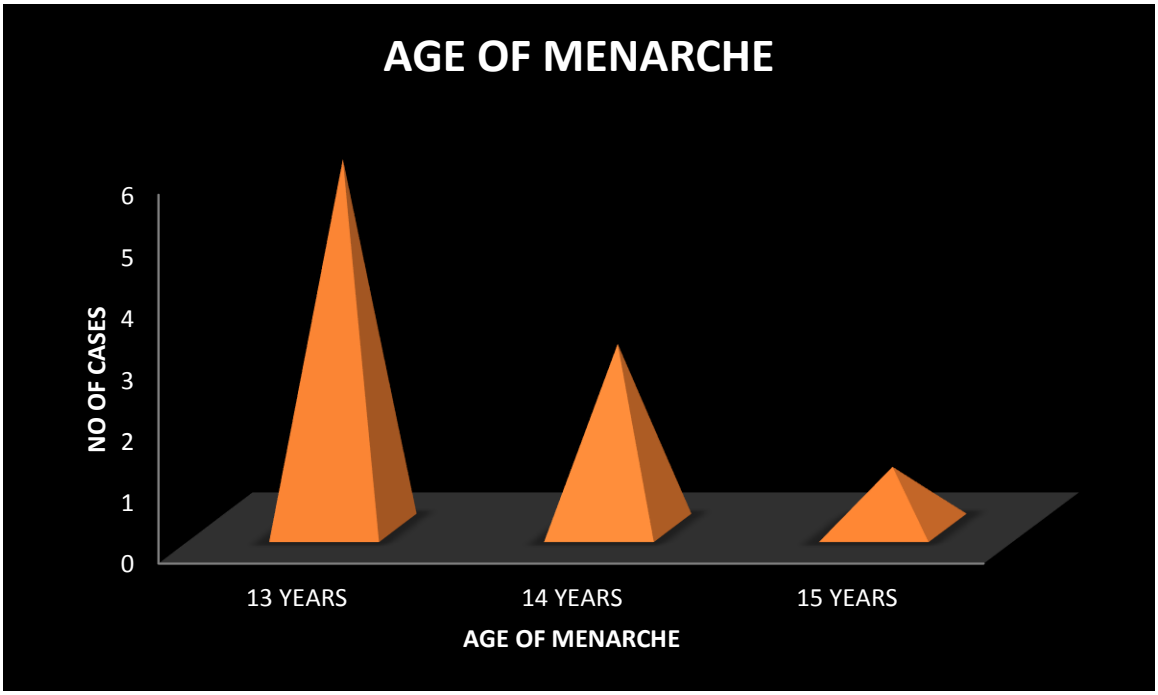
In 10 cases 5(50%) had respiratory rate at rate of 15-17/min and 5(50%0 had respiratory rate at a rate of 18-20/min.

TABLE 10

DISTRIBUTION OF CASE ACCORDING OT AGE OF MENARCHE

AGE OF MENARCHE	
MENARCHE AGE	NO OF PATIENTS
13 YEARS	6
14 YEARS	3
15 YEARS	1

CHART 10



Interpretation:

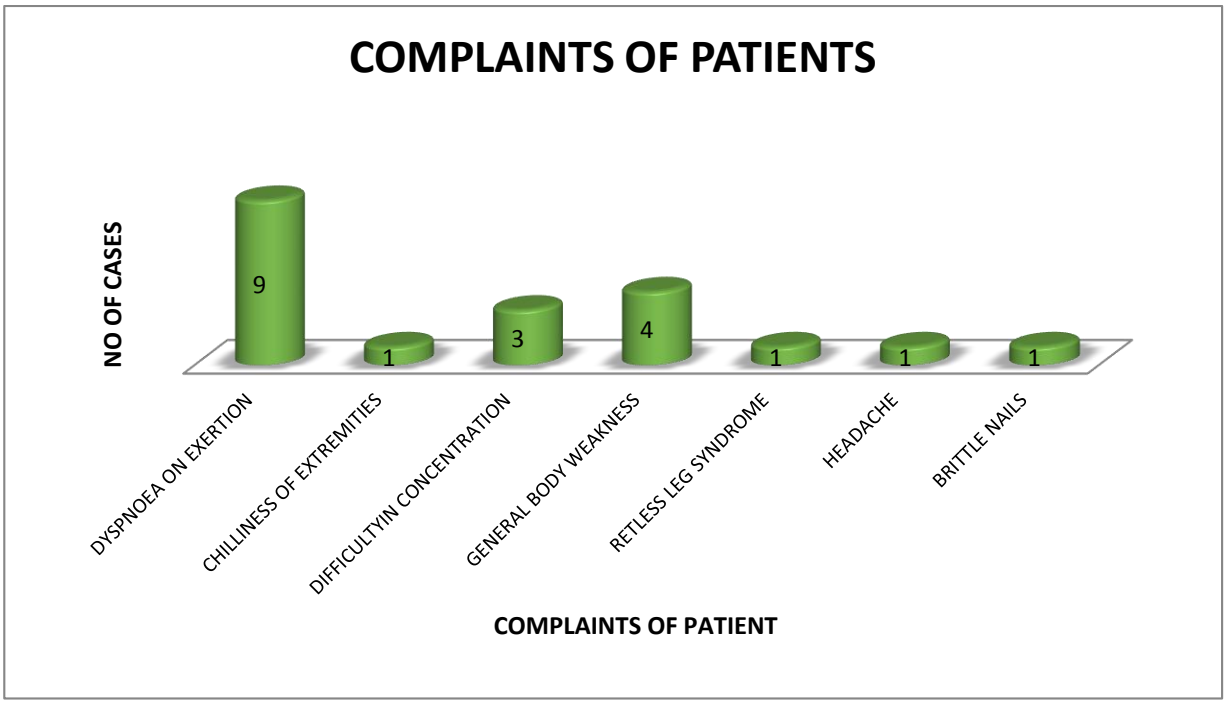
In 10 cases 6(60%) of them attained puberty by 13 years, 3 (30%) of them attained puberty by 14 years and 1(10%) attained puberty by 15 years.

TABLE 11

DISTRIBUTION OF CASES ACCORDING TO COMPLAINTS

COMPLAINTS OF PATIENTS	NO OF CASES
DYSPNOEA ON EXERTION	9
CHILLINESS OF EXTREMITIES	1
DIFFICULTY IN CONCENTRATION	3
GENERAL BODY WEAKNESS	4
RETLESS LEG SYNDROME	1
HEADACHE	1
BRITTLE NAILS	1

CHART 11



Interpretation:

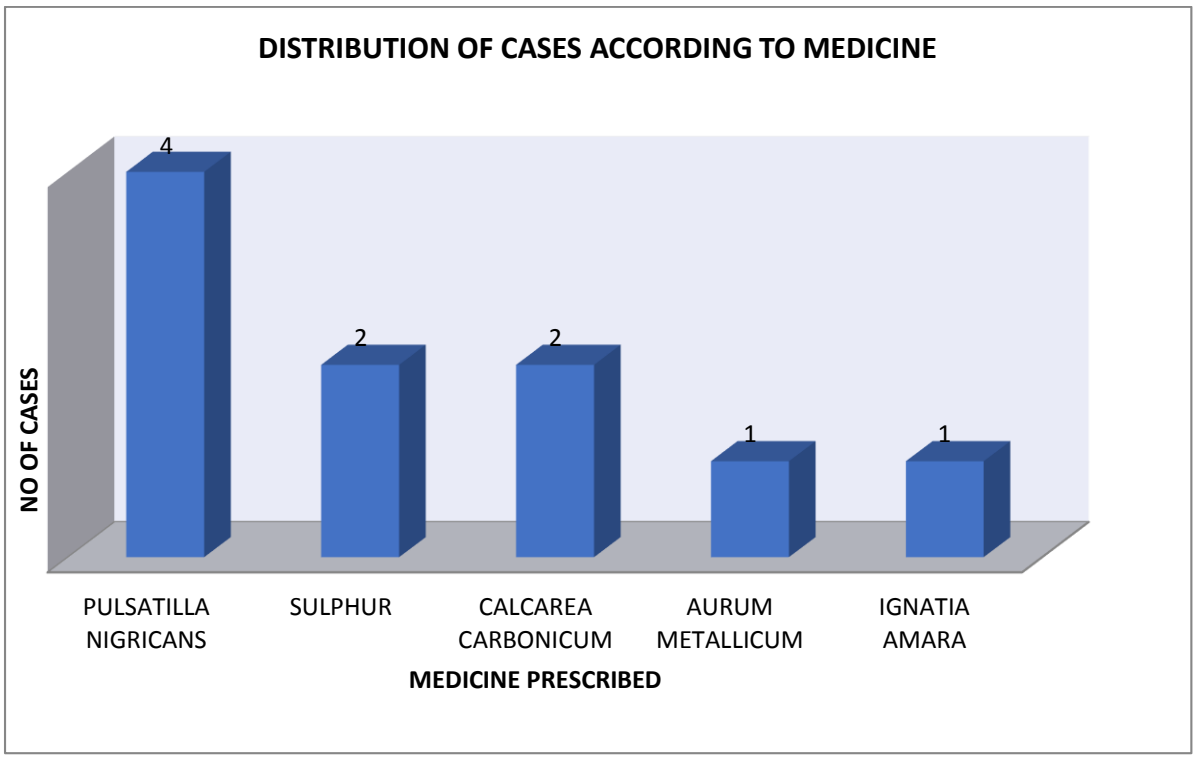
In10 Cases,9(90%) had exertional dyspnoea as chief complaint,1(10%) had Chilliness of extremities,3(30%) had difficulty in concentration,4(40%) had general body weakness,1(10%) had restless leg syndrome,1(10%) had headache,1(10%) had brittle nails as their main presenting illness.

TABLE 12

DISTRIBUTION OF CASES ACCORDING TO THE MEDICINE ADMINISTERED

MEDICINE USED	NO OF PATIENTS
PULSATILLA NIGRICANS	4
SULPHUR	2
CALCAREA CARBONICUM	2
AURUM METALLICUM	1
IGNATIA AMARA	1

CHART 12

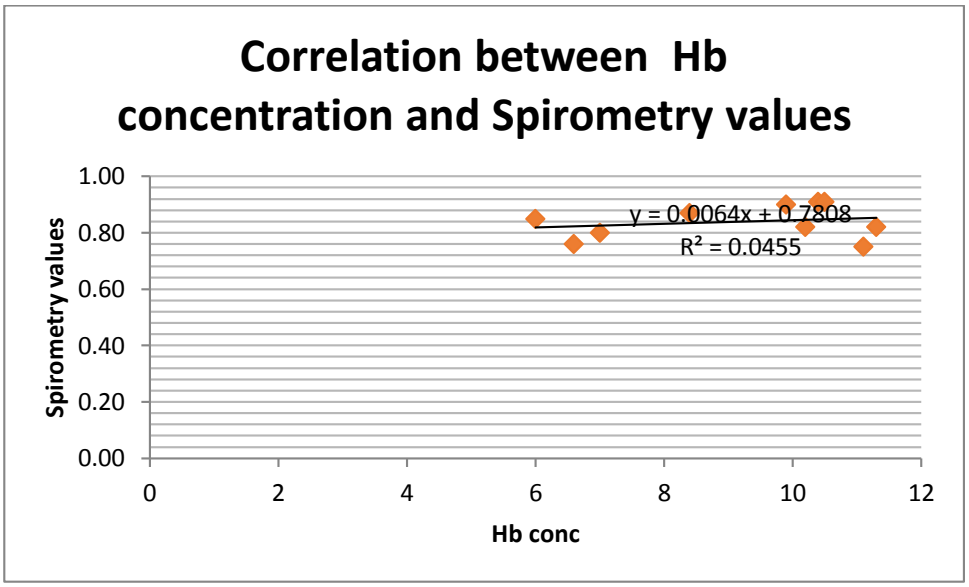


Interpretation:

In 10 cases, 4 (40%) were given Pulsatilla Nigricans,2 (20%) Sulphur, 2 (20%) Calcarea Carbonicum, 1(10%) Aurum Metallicum and 1(10%) Ignatia Amara for their Anemia

STATISTICAL ANALYSIS:

Correlation analysis



Interpretation:

The value of R2, the coefficient of determination, is 0.0455. The value of R is 0.2132, although we observe positive correlation, the relationship between the variables is weak. Improved Hb values supports the increase of spirometry values, which indicates improved lung function/ pulmonary function.

T test Haemoglobin conc before and after treatment

Treatment 1	Treatment 2	*Diff* (T2 - T1)	*Dev* (Diff - M)	*Sq. Dev*
9.9	11.3	1.4	0.07	0
8.4	9.9	1.5	0.17	0.03
10.2	10.4	0.2	-1.13	1.28
6.4	6.6	0.2	-1.13	1.28
5.6	6	0.4	-0.93	0.86
6.7	10.5	3.8	2.47	6.1
10.7	11.1	0.4	-0.93	0.86
7	8.4	1.4	0.07	0
5.8	7	1.2	-0.13	0.02
7.4	10.2	2.8	1.47	2.16
		M: 1.33		S: 12.6

Mean: 1.33, $\mu = 0$

S2 = SS/df = 12.6/(10-1) = 1.4

S2M = S2/N = 1.4/10 = 0.14

SM = $\sqrt{}$S2M = $\sqrt{}$0.14 = 0.37

T-value Calculation, t = (M - μ)/SM = (1.33 - 0)/0.37 = 3.55

Interpretation: The value of t is 3.554, which is higher than table value and the value of p is .00617; which indicates the result is highly significant at p < .05.

T test Spirometry value before and after treatment

Treatment 1	Treatment 2	*Diff* (T2 - T1)	*Dev* (Diff - M)	*Sq. Dev*
0.64	0.82	0.18	0.12	0.01
0.53	0.90	0.37	0.31	0.1
0.94	0.91	-0.03	-0.09	0.01
0.86	0.76	-0.1	-0.16	0.03
0.81	0.85	0.04	-0.02	0
0.89	0.91	0.02	-0.04	0
0.83	0.75	-0.08	-0.14	0.02
0.70	0.87	0.17	0.11	0.01
0.80	0.80	0	-0.06	0
0.80	0.82	0.02	-0.04	0
		M: 0.06		S: 0.18

Mean: 0.06; $\mu = 0$

S2 = SS⁄df = 0.18/(10-1) = 0.02

S2M = S2/N = 0.02/10 = 0

SM = √S2M = √0 = 0.05

T-value Calculation= t = (M - μ)/SM = (0.06 - 0)/0.05 = 1.31

Interpretation: The value of t is 1.31, which is higher than table value and the value of p is .2236; which indicates the result is not significant at p < .05.

9. DISCUSSION:

Anemia is one of the commonest health issue that is faced by both developing and developed countries. In India, which is a developing country, the rate of anemia measures nearly about **55% of the female population**.[28]Of them iron deficiency anemia is the commonest one. Though there has been so many prophylactic measures implemented against iron deficiency anemia, still the rate of women suffering from iron deficiency anemia has not changed much. It is most commonly seen in adolescent girls of child bearing age group. Iron deficiency anemia develops only when the total assimilated iron is completely depleted. The signs and symptoms starts very gradually, but most of the times respiratory and circulatory symptoms are only clinical evident.[11] The most common symptoms are fatigue, restlessness, breathing difficulty, headache, pica, insomnia, etc. It may even lead to cardiac failure in severe cases. The signs include Pallor, Tachycardia, Brittle fingernails, Cracked lips, Smooth, sore tongue. Breathing difficulty, fatigue, lack of concentration, headache, restless leg syndrome and brittle nails are the common symptoms present in most of the anemic subjects in this study.[39]

Dyspnoea occurs when the Oxygen necessary for Lungs are not supplied properly. Because in iron deficiency anemia,the number of iron necessary to carry adequate Oxygen is reduced. As iron deficiency anemia takes longer time to develop, our human body gets adopted to it by using it's compensatory mechanism i.e., the viscosity of the blood in severe anemia falls to as low as 1.5 times that of water rather than the normal value which is about 3.This decreases the resistance to blood flow in the peripheral blood vessels so that far greater than normal quantities of blood then flows through the tissues and return to the heart, increasing the cardiac output to a still higher level. **The increased cardiac output partially off-sets the reduced Oxygen carrying effect in anemia, because even though each quantity of blood carries only small quantities of Oxygen, the rate of blood flow may be increased enough so that almost normal quantities of Oxygen are actually delivered to the tissues**.[03]According to a study conducted by Hinkelbein J, Osika, and Fiedler, F a good co relation was found between SpO_2 and severe anemia.[23] Whereas in this study **none of the anemic subjects in spite of their severity of anemia had normal SpO_2** when measured using non –invasive Pulse-oximetry at resting phase.

Although severe anemia was observed among study subjects, their SpO_2 remained normal. For understanding the reason behind this scenario, the pulmonary functions of the

anemic subjects were measured using a standard test called Spirometry. The study conducted by Emily P.Brigham, Meredith C, et all in US Women suggested that iron status may play a role in lung function in US Women.[19]Similar studies conducted by Sharad Jain and JL Agarwal at Hapur, U.P, **India[34]**and the research conducted by k. Amrutha Kumari, T.Ramam Kranthi,[14] et all suggests that **Forced Vital Capacity (FVC),Peak Expiratory Flow Rate(PEFR), FEV_1 were Significantly lowered in anemic group compared to control group**. Even **in this study the FVC, FEV_1 and FEV_1 % ratio was very significantly lowered in about 80% of the subjects with no history of cardiac or pulmonary pathology** but 20% of the study had Normal ventilatory function. Of them **restrictive lung disease was relatively higher** compared to Obstructive Lung disease with **a percentage of 87.5%** which is very similar to the work conducted by K Amrutha kumara, T Rama Kranthi, et all at DR.V.R.K Women's Medical College Teaching Hospital and Research Centre, Azinagar, Telungana, India. They suggested that the decrease **in FVC and FEV_1 suggested a restrictive pulmonary impairment, even though the value are not statistically significant**.[14]According to the work held by Sharad Jain and Agarwal suggests that **decreased strength of respiratory muscles including diaphragm reduces the pulmonary function in anemic subjects.** Weakness of accessory muscles of respiration adds to decreased PEFR and FEV_1 in persons suffering from anemia. Restrictive lung disease occurs when Lung parenchyma is not able to expand fully or the muscles responsible for respiration become tight. The **presentation suggestive of respiratory muscle weakness includes unexplained dyspnoea, chronic respiratory failure, in the absence of recognized cardiac or pulmonary cause[01].**

The **Heart rate** measured in study population **except severe anemic subjects** had **normal heart rate** ranging between 60-100 which is similar to the work conducted by Tuncer M, et al who concluded that there **was no significant difference in HR** in patients with iron deficiency anemia.[31]Whereas in this study **Tachycardia was found in my subjects with severe anemia.** The **Pulse Pressure** which is the difference of Systolic and diastolic blood pressure expresses how well your heart pumps out the blood. It was calculated in anemic subjects. The result showed **marked difference in** about **40%** of the study subjects which is similar to the work conducted by Hyun Yoon, Jun Ho Lee, et all at Korea.[23]The **Respiratory Rate** was in **normal** limits in this study which shows that respiratory rate is not correlated with anemia according to this study. The **Pulse rate** ranged between**90-100 in half of the population study** which shows that pulse rate is associated with anemia.

As anemia is considered as a deadly condition which affects huge population of the world so many measures have been taken by WHO to reduce anemia cases by 2025.To achieve this target, the government of India has set up a team consisting of Capoor, Gade and Chetna in the year 2000 who have initiated several supplementary nutrition programmes at both central and state level.[13] But one of the main disadvantage of the team is that they target the extremes of life i.e., the preschool and the elderly but the adolescent group which shares greater percentage of suffering from anemia is left unnoticed. Thus the report shows that the iron supplementation programme in India have not been successful as India holds the top most position in anemia in the world in 2005- 2006 survey[13] .For proper treatment the cause for the development of anemia should be found out. In Homoeopathic system of medicine our Master Hahnemann has already stated the importance in assessing the basic cause for the development of any condition in Aphorism (aph) 5 as "Fundamental and Exciting cause". He has also emphasized the removal of maintaining cause "Causa occasionalis" in aph 7 for proper cure to take place.

The Fundamental principle in which Homoeopathy stands is **"Individualization"**. Recent **study conducted in the year 2015** had concluded that **the treatment plan for iron deficiency should be made on individual basis [29] which supports our method of treatment.** Thus according to symptom similarity and individualization proper similimum was selected for each individual after a brief case taking and proper repertorization and reference with proper material medica. The patients were also advised to include iron rich food in their diet. The Similimums obtained in this study were Pulsatila Nigricans, Sulphur, Calcarea Carbonica, Ignatia and Aurum Metallicum. Of them **PULSATILANIGRICANS** was more useful which showed a greater improvement in Hb content which improved by 2g/dl in 3-4 weeks as accordance with the standards fixed. [07]The potency which was used includes 200 and LM potencies.200 potency was used on Kentian concept that the potencies have much milder curative action than the higher and highest potencies. They are far more suitable to very nervous, excitable women. [02]As said by Dr.Kent," In chronic conditions, for the first prescription, a single dry dose on tongue is the best" [02] which was also followed in this study. Dr.Aegidi says that one must repeat the dose after a period of 8 days when the given remedy does not undergoes any alteration after administration of previous one. [02] Thus in this study 200 potencies were repeated at 8th day while taking follow up of the patient and noted no alteration of health.[02] Another most frequently used potencies were LM potencies.

In 6th Edition of Organon in footnote of aph 246 our Master says the 50millesimal potency as 'New, Altered and Perfected Method' Dr. Pierre Schmidth published an article on LM Potency as 'The Hidden Treasures of the Last Organon'. [02]One of the main advantage of 50 millesimal potency is selected remedy can be repeated daily and for months. Our Master in aph 247 states that 'If the succeeding dose is changed slightly every time, then the vital principle maybe altered without difficulty by the same medicine and thus the cure brought nearer'. Similarly in this study also patients who took medicines in 50millesimal potency showed rapid improvement comparing patients who took other potencies. As Dr. J.T.Kent says, 'In chronic disease, the patient must be kept under the action of a remedy for a long time and the remedy must be managed so that curative power will not be let down. In this way cure is always mild, gentle and permanent'. [02] Following the words of Dr.Kent the patients were kept under the influence of the same remedy till their progress in Hb level and pulmonary parameters were noted.

After regular follow ups of cases at weekly interval, for minimum of a month **post assessment of Hb c**oncentration was done and **90% of cases showed marked improvement**. To assess the correlation between Anemia and Pulmonary function**, post assessment PFT** was also done again to check for any improvement.**80% of the cases who were interpretated with restrictive or obstructive lung pathologies were having Normal ventilatory function by the second test.10% of the case who had moderate restriction showed improvement and were diagnosed with mild restriction.**10% of case showed no improvement. **2 case who were having normal ventilator function had obtained better and increased values of FVC and FEV_1 values comparing to the previous test.** There are no adequate literary works that shows improvement of the Pulmonary function in anemic subjects after administration of Homoeopathic remedies according to my knowledge. Thus according to my study the effectiveness of Homoeopathic similimum improving anemia and thereby enhancing Pulmonary function and the existence of positive relationship between anemia and decreased pulmonary function has been established clearly. But there is no positive relationship between the severity of anemia and their pulmonary function.

10. SUMMARY

The subjects were selected from those patients attending OPD's and IPD's of SKHMCH according to inclusion and exclusion criteria.10 cases were selected from age group ranging from 12-45 years, of female population. After verifying the Hb concentration and confirming for anemia the patients were selected for the study.The study was conducted mainly to assess the co relation between anemia and lowered pulmonary function and to elicit the effectiveness of Homoeopathy in treating Anemia. All the cases were followed up to a minimum of 4 weeks and were considered for statistical study.

Out of 10 cases, 50%had Moderate anemia, 30%had severe anemia and 20% had mild Anemia. Out of them 50% had Moderate airway restriction, 10% had Mild airway restriction, 10% had severe airway obstruction and 10% had Mild airway obstruction. And 20% had Normal ventilator functions. Out of these 10 cases, 60% of them had Oxygen saturation ranging between 96-98 and 40% had Oxygen saturation measured between 99 -100

After treating for minimum of 4 weeks using exact Homoeopathic Similimum among 10 cases, 60% of them had Mild anemia, 20% of them had Moderate anemia and 20% had severe anemia. Out of them 80% had Normal ventilator function, 10% had mild airway restriction and 10% had moderate restriction. The Oxygen saturation level remained the same with 60% ranging between 96-98 and 40% ranging between 99 -100.

Thus overall, improving the Hb concentration using Homoeopathic Similimum improved the pulmonary functions in fertile females who suffered from anemia which clearly demonstrated the effectiveness of Homoeopathic Similimum in improving the pulmonary function by treating anemia.

11. CONCLUSION:

Thus the co-relation between Anemia and Pulmonary function suggests that subjects suffering from anemia have deceased pulmonary functions, most of them with restrictive lung disease and Homoeopathy does a great role in treating anemia which would improve the pulmonary function and thus enhance the day to day activities in Indian women. According to WHO if the prevalence of anemia is above 40%it is considered as a problem of high magnitude. Nearly 50% are not aware that they have this condition. Thus there is an urgent need for improving nutritional status of reproductive aged women through nutritional education, community awareness and providing them with proper medication, because if this scenario continues only 25% on the target for reducing anemia to 50% by WHO in 2025 could be achieved.

12. LIMITATIONS:

- Although Spirometric data was found statistically insignificant, there were improvement in 80% of cases, which was evident; but in 2 cases, FEV1 values was high and FEV1/FVC ratio was comparably low. This contributed to statistical variation. There was overall improvement in all the subjects, which was substantiated in results.
- PFT cannot reveal pulmonary disease unless the functions are significantly lowered over an earlier testing.
- Test does not provide anatomical diagnosis but can help localize it to a section of airway or lung.
- Test must be multiple since no single test can evaluate total abnormality at one time.
- The test becomes difficult for subjects with dental abnormalities.
- Since this is a time bound study, the cases couldn't be followed for a longer period.
- There was no control group as such since the sample size was small.

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