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A STUDY ON ANAEMIA AMONG THE LABOURERS IN SELECTED POCKETS OF THENI DISTRICT

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ABSTRACT

Studies on anaemia are more, globally and nationally. However, a pilot study was undertaken to think about the local needs on the haematological status of workers in mills and in agricultural lands of Theni District. Keeping in mind, to think the problem locally; to make this work, more community centered and to reaching the unreached and to fill some lacunae in this field, the current investigation aimed at dealing with the haematological status of workers in dhal mill, cotton mill, oil mill, brick kiln, spinning mill and farmers in agriculture were studied with their blood samples and it was checked with controls.

KEYWORDS: Studies on anaemia haematological Theni District. with controls.

INTRODUCTION

Anaemia is one of the major public health problems in many developing countries. Anaemia occurs when the level of healthy red blood cells (RBCs) in the body becomes too low. Red blood cells contain hemoglobin - a red, iron-rich protein - that gives blood, its red color. When you are anaemic, your body produces too few healthy red blood cells, loses too many of them or destroys them faster than they can be replaced. Thus, your blood becomes low in red blood cells to carry oxygen to your tissues, leaving you tired.

Iron plays an essential role in oxidative energy production. Iron deficiency anaemia (IDA) is due to inadequate supply of iron, the bone marrow cannot produce enough haemoglobin. The consequences of iron deficiency include impaired immunity, increased morbidity from infectious disease and decreased physical capacity. Iron deficiency and anaemia reduce the

working capacity of individuals and entire populations, bringing serious economic consequences and obstacles to National development.

Agriculture is the backbone of Indian economy where more than half of total workforce employed in agricultural sector. In brick kilns Villagers assaulted all the time by the smoke, belching out the area, afflicted with breathing problems and lung diseases. The individuals working in the dusty sections of a textile mill had byssinosis. Apart from deaths due to explosions and fire, Coughing, sore throat, dizziness, methemoglobinemia and anemia are common effects of ingestion or inhalation of chlorate dust. Inhalation of sulfur dust causes respiratory infections, asthma, eye infections and other chronic lung diseases.

OBJECTIVES

- ✓ To measure the health status of the workers and to quantify their health problems.
- ✓ To compare the health status of male and female workers.
- ✓ To do research in particular problems of occupational health hazards.
- ✓ To give health and health related information's.
- ✓ To promote the proper use of health services available to them.
- ✓ To give knowledge and awareness about various health problems.
- ✓ To study the manifestation of haematological disorders.
- ✓ To observe reference ranges for various blood cell indices.
- ✓ To study the clinical presentation of anemia.
- ✓ To study the frequency of iron deficiency anaemia.
- ✓ To correlate the haemoglobin level with haematological parameters (MCV, MCH, MCHC) in anaemia.

MATERIALS AND METHODS

❖ Sample population

The data was collected from Brick kiln workers, oil mill workers, cotton mill workers, spinning mill workers, dhal mill workers, agriculture workers in theni district constituting 300 individuals belonging to various age groups from 20 to 60 yrs and they were classified into 4 groups.

Group 1 - 20-30
Group 2 - 31-40
Group 3 - 41-50

Group 4 - 51-60

General in formations like age, occupation, sex, education, hereditary disease & common diseases were collected using questionnaire cum interview method.

These three hundred individuals are subjected to the haematological investigations as follows.

❖ **Samples**

Venous and capillary blood was preferred for most of the haematological investigations. Blood sample was collected from workers of various occupations. Because the packed cell volume (PCV), Red cell counts (RBC) and Haemoglobin (HB) content remained constant. Since the blood was with drawn from anticubital vein using a sterilized syringe about 2.5 to 3ml were particularly used for drawing blood from individual with less apparent veins. Successful vein puncture was facilitated by keeping the person's arm warm. Applying tourniquet to the upper arm 23SWg needle was used to enable at least2ml of blood flow satisfactorily.

After detaching the needle, the blood was delivered carefully from the syringe into a sterilized container and gently mixed with anticoagulant.

❖ **Anti -coagulant**

A number of different anticoagulants are in use. Sodium and potassium salts of ethylene diamene tetra acetic acid (EDTA), tri sodium citrate, sodium citrate was preferred for the present haematological investigation.

Anticoagulant did not alter the size of the cells and other haematological parameters. Besides sodium citrate removes calcium which is essential for coagulation.

METHODOLOGY

Haematological Investigation

✓ **Haemoglobin concentration (Hb)**

The graduated Haemoglobin tube is filled upto the 20 mark 2grams with N/W Hcl and 0.2ml of blood poured into it. Mix the acid haematin solution in the tube of glass rod and keep the tube to stand for 10mts. The brown solution of acid haematin is diluted drop by drop with distilled water and stirred until the colour matches with that of standards. Take the results in grams and percentage.

✓ **PCV**

The volume of packed red cells can be determined by centrifugation of blood in a glass tube. As originally described by wintrobe the haematocrit was the designed to use in the measureme .t and the VPRC was the unit of measurement. A selected method for performing the wintrobe haematocrit was advocated by the world health organization.

The microhaematocrit was found more convenient to use than the wintrobe macro method and new used more routinely. Although the manual haemocrit. This method is still useful for situations in which automated counters are not available. Multifunctional electronic (or) calculating haematocrit values are also in use.

✓ **Tc (RBC)**

Prepare 1:2 dilution of the blood in the diluting fluid in a thoma pipette .Alternatively, draw blood upto 0.5 mark and dilution fluid upto 101 mark.

Charge the improved neubauer counting chamber, carefully with the well mixed diluted blood in the if thoma pipette are remember to discard first 3-5 drops before charging the chamber. Allow the cells to settle in a moist chamber foe 3-4 mts.

Locate the ruled area of the counting chamber under 10x objective of the microscope. Check that the cells are evenly distributed.

Using 40 x objectives, count the total number of red cells in fire groups of 16 small squares in the central ruled area.

✓ **MCV**

The MCV is the volume of the average red blood cell of a given sample of

$$MCV = \frac{\text{Haematocrit}}{\text{RBC in mill/mm}} \times 10$$

✓ **MCH**

The MCH is the amount of haemoglobin by weight in the average red blood cell of the some of blood.

$$MCH = \frac{\text{Hg in 1ml blood}}{\text{RBC in mill / mm}} \times 10$$

✓ **MCHC**

$$MCHC = \frac{\text{Hb\% in g / 100ml blood}}{\text{Haematocrit}} \times 100$$

STATISTICAL METHODS

The collected data were subjected to the following statistical analysis for interpreting the results.

Arithmetic Mean

Mean was calculated for various values. The results were computed using the following formula

$$\text{Arithmetic mean} \quad X = \frac{\sum X}{N}$$

Where,

X = Arithmetic mean, $\sum X$ = Sum of value of variables

N = Number of variables

Standard Deviation

Standard Deviation was calculated for the results obtained in the study. The results were computed using the formula

$$S.D = \sqrt{\frac{\sum (X-X)2}{N}}$$

Where,

S.D = Standard Deviation, X = No. of Individuals,

CHI-SQUARE TEST

$$X^2 = \sum \left[\frac{(O-E)^2}{E} \right]$$

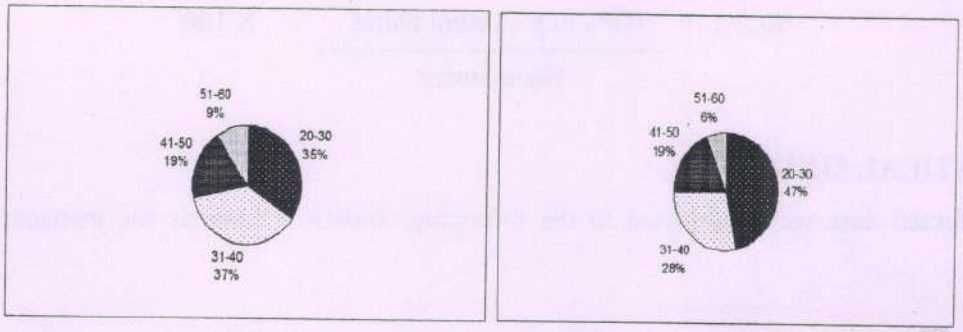
Where

O = Observed value, E = Expected value

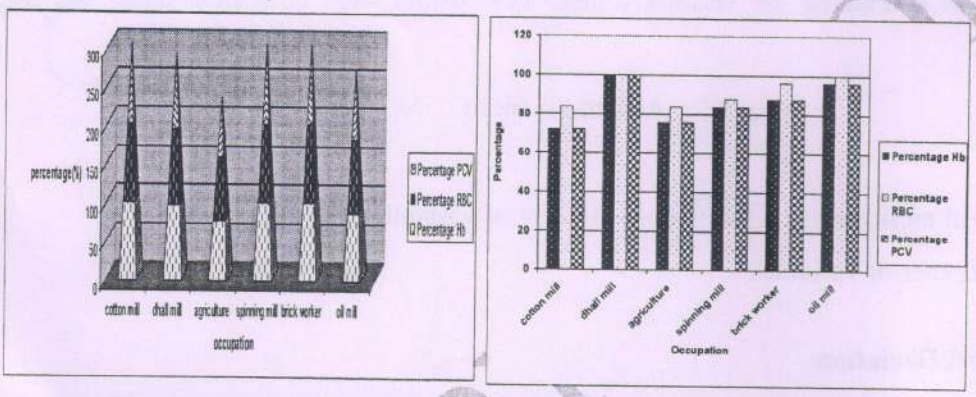
ANALYSIS OF VARIANCE

$$F = \frac{\text{Variance between sample}}{\text{Variance within sample}}$$

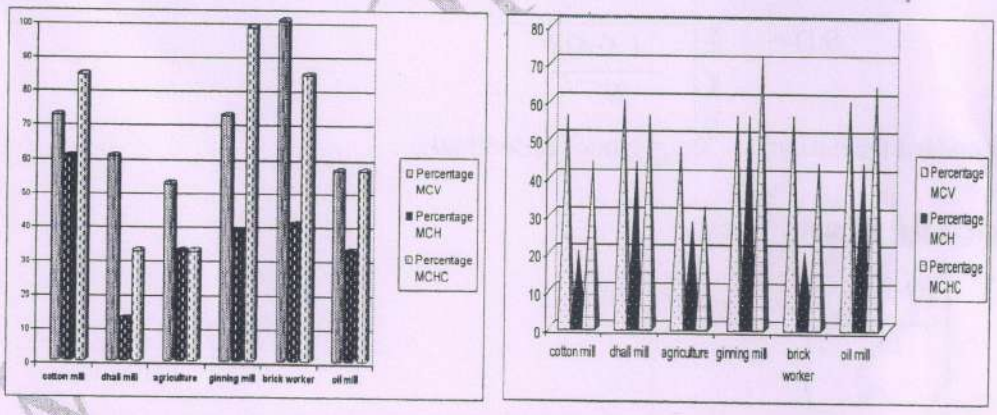
FIGURES



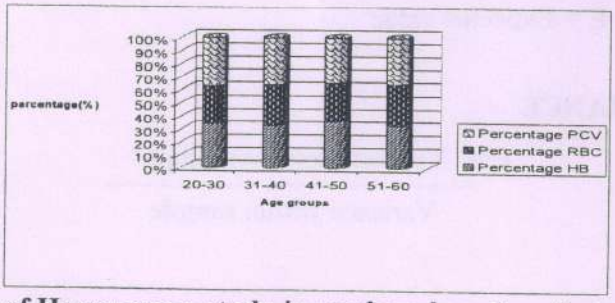
Population size of male and female workers



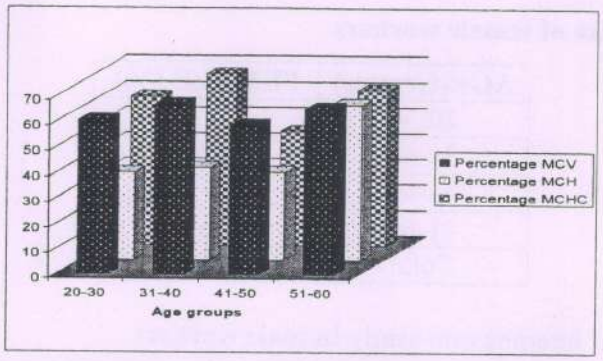
Percentage of haemogram study in male and female workers



Percentage of Erythrocyte constants in male and female workers



Percentage of Haemogram study in workers based on their age group.



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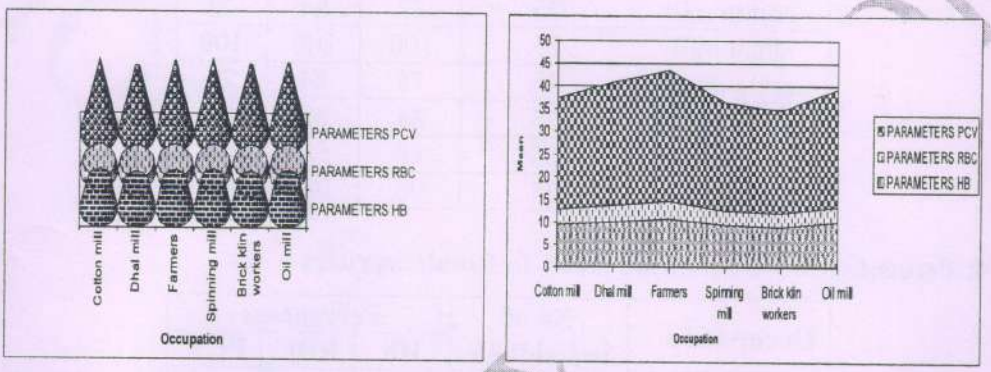
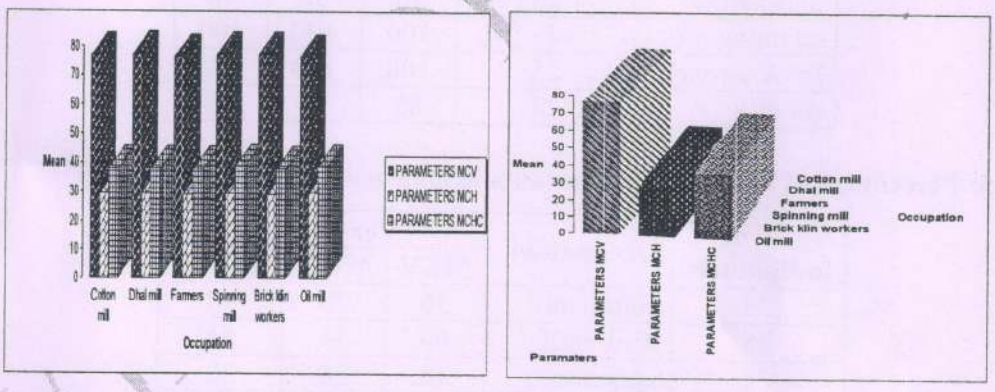


Mean value of Haemogram in male and female workers based on their occupation.



Mean value of erythrocyte constants of male and female workers based on their occupation.

Table 1: Population size of male workers

AGE(Groups)	MALE (%)
20-30	34.6
31-40	36.6
41-50	19.3
51-60	9.3
Total	99.8

Table 2: Population size of female workers

AGE(Groups)	FEMALE (%)
20-30	46.6
31-40	28
41-50	19.3
51-60	6
Total	99.9

Table 3: Percentage of haemogram study in male workers

Occupation	No of individuals	Percentage		
		Hb	RBC	PCV
cotton mill	25	72	84	72
dhall mill	25	100	100	100
agriculture	25	76	84	76
spinning mill	25	84	88	84
brick worker	25	88	96	88
oil mill	25	96	100	96

Table 4: Percentage of haemogram study in female workers

Occupation	No of individuals	Percentage		
		Hb	RBC	PCV
cotton mill	25	100	100	100
dhall mill	25	96	96	96
agriculture	25	76	80	76
spinning mill	25	100	100	100
brick worker	25	100	100	100
oil mill	25	88	92	88

Table 5: Percentage of Erythrocyte constants in male workers

No of individuals	Occupation	Percentage		
		MCV	MCH	MCHC
25	cotton mill	56	20	44
25	dhall mill	60	44	56
25	agriculture	48	28	32
25	ginning mill	56	56	72
25	brick worker	56	20	44
25	oil mill	60	44	64
150	Total			

Table 6: Percentage of Erythrocyte constants in female workers

No of individuals	Occupation	Percentage		
		MCV	MCH	MCHC
25	cotton mill	72	60	84
25	dhall mill	60	12	32
25	agriculture	52	32	32
25	ginning mill	72	38	98
25	brick worker	100	40	84
25	oil mill	56	32	56
150	Total			

Table: 7 Percentage of Haemogram study in workers based on their age group.

No of individuals	Age groups	Percentage		
		HB	RBC	PCV
122	20-30	82.78	69.67	89.34
97	31-40	92.78	85.56	100
58	41-50	96.55	81.03	91.37
23	51-60	95.65	91.3	100
300	Total			

Table: 8 Percentage of Erythrocyte constants in workers based on their age group.

No of individuals	Age groups	Percentage		
		MCV	MCH	MCHC
122	20-30	60.65	34.42	58.19
97	31-40	67.01	36.08	67.01
58	41-50	58.62	34.48	44.82
23	51-60	65.21	60.86	60.86

Table 9: Mean value of Haemogram in male workers based on their occupation.

OCCUPATION	PARAMETERS		
	HB	RBC	PCV
Cotton mill	11.12	3.83	29.44
Dhal mill	9.56	3.24	25.08
Farmers	10.51	3.63	27.8
Spinning mill	11.17	3.75	28.92
Brick klin workers	9.84	3.38	26.12
Oil mill	10.4	3.51	27

Table: 10 Mean value of Haemogram in female workers based on their occupation.

OCCUPATION	PARAMETERS		
	HB	RBC	PCV
Cotton mill	9.57	3.22	24.76
Dhal mill	10.22	3.55	27.28
Farmers	10.86	3.74	28.92
Spinning mill	9.48	3.1	23.88
Brick klin workers	8.96	3.03	22.96
Oil mill	10.13	3.39	26.04

Table 11: Mean value of erythrocyte constants of male workers based on their occupation.

OCCUPATION	PARAMETERS		
	MCV	MCH	MCHC
Cotton mill	76.72	29.24	37.96
Dhal mill	77.36	29.56	37.96
Farmers	76.44	28.96	37.72
Spinning mill	77.24	29.48	38.56
Brick klin workers	77.08	29.12	37.96
Oil mill	76.6	29.64	38.6

Table 12: Mean value of erythrocyte constants of female workers based on their occupation.

OCCUPATION	PARAMETERS		
	MCV	MCH	MCHC
Cotton mill	76.44	29.8	38.96
Dhal mill	76.8	28.84	37.48
Farmers	77.36	29.08	37.6
Spinning mill	76.7	29.92	39.96
Brick klin workers	75.76	29.04	38.92
Oil mill	76.84	29.28	38.36

Table 13: CHI-SQUARE ANALYSIS IN HB

O	E	O-E	$(O-E)^2$	$(O-E)^2/E$
21	15.50	5.5	30.25	1.95
10	15.50	-5.5	30.25	1.95
129	84.5	44.5	1980.2	23.43
140	84.5	55.5	3080.3	36.45
				63.78

Table 14: CHI-SQUARE ANALYSIS IN RBC

O	E	O-E	$(O-E)^2$	$(O-E)^2/E$
12	32	-20	400	12.5
52	32	20	400	12.5
138	118	20	400	3.38
98	118	-20	400	3.38
				31.76

Table 15: CHI-SQUARE ANALYSIS IN PCV

O	E	O-E	$(O-E)^2$	$(O-E)^2/E$
0	0.5	-0.5	0.25	0.5
1	0.5	0.5	0.25	0.5
150	149.5	0.5	0.25	1.67
149	149.5	-0.5	0.25	1.67
				4.34

Table 16: CHI-SQUARE ANALYSIS IN MCV

O	E	O-E	$(O-E)^2$	$(O-E)^2/E$
62	54.5	7.5	56.25	1.03
47	54.5	-7.5	56.25	1.03
88	95.5	-7.5	56.25	0.58
103	95.5	7.5	12.25	0.12
				2.76

Table 17: CHI-SQUARE ANALYSIS IN MCH

O	E	O-E	$(O-E)^2$	$(O-E)^2/E$
150	149.5	0.5	0.25	1.67
149	149.5	-0.5	0.25	1.67
0	0.5	-0.5	0.25	0.5
1	0.5	0.5	0.25	0.5
				4.34

Table 18: CHI-SQUARE ANALYSIS IN MCHC

O	E	O-E	$(O-E)^2$	$(O-E)^2/E$
0	2.5	0.5	0.25	0.1
3	2.5	-0.5	0.25	0.1
147	147.5	-0.5	0.25	1.69
148	147.5	0.5	0.25	1.69
				3.58

Table 19: ONE WAY ANOVA IN AFFECTED NDIVIDUALS

SOURCE OF VARIATION	SS	DF	MS	F - VALUE	F - CRIT	P - VALUE
Between samples	97.26	5	19.45	0.054	2.53	$P \leq 0.05$
Within samples	10690.5	30	356.35			
TOTAL	10787.7	35				

RESULT

In our present study among 300 individuals, 96.55% were anaemic in the age group of 41-50 years, 95.65% in 51-60 years, 92.78% in 31-40 years and 82.78% in 20-30 years.

It should be noted that the data presented by (Beveridge BR et al) showed that IDA is more common in women in the age group between 30-50 years and in men in the age group between 50-70 years. In contrast our study showed that Anaemia is most commonly prevalent in the age group of 41-50 years. These observations were found from workers who are exposed to varied nature of works. Workers of dhal mill (98%) are highly anaemic when compared to others; this may be due to the dust which affects the lungs and respiratory tract.

Brick kiln workers (94%) and spinning mill workers (94%) were found to be anaemic. Because of heavy exposure to smoke and suit.

In our observation the average MCV was 79.74 fl. Similarly the mean value of MCH was 29.32pg and the mean value of MCHC was 38.33 %. This observation was similar, which shows mean MCV to be 74 fl, mean MCH to be 20pg and mean MCHC to be 32%. (Bainton DF, Finch CA, 1994).

SUGESSTIONS

This study suggests the need for implementation of protective measures such as installation of hoods, dust filters, ventilators, general cleanliness and other safety measures such as use of gloves on hands and shoes on feet, aprons, masks, etc. so as to reduce the risk of respiratory problems. To create awareness about health and nutrition education.

The following recommendation were suggested for controlling the occupational lung disease and the associated biochemical changes caused by cotton dust in the ginning factory women labourers.

- Periodic health surveillance to be made essential to control both pulmonary abnormalities and biochemical changes.
- Proper treatment to be given to the affected women.
- Awareness to be created among workers.
- Some low cost iron rich foods like greens, drumstick leaves and jaggeries were recommended to be added in their diet.

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