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Research Article

COMPARITIVE STUDY OF HAEMOGLOBIN LEVELS IN ALCOHOLICS AND NON ALCOHOLICS VEGETARIANS AND NON VEGETARIANS

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ABSTRACT

Background and Objectives: Excessive alcoholism causes premature death through overdose and through chronic damage to multiple systems like hepatobiliary system, cardiovascular system, central nervous system, haematopoietic system and other systems. Vitamin B12 (cobalamin) is an essential vitamin, required for DNA synthesis (and ultimately cell division) and for maintaining nerve myelin integrity. It is found almost exclusively in animal-based products including red meats, poultry, seafood, milk, cheese and eggs. As vitamin B12 is produced by bacteria in the large intestines of animals, plant-based foods are generally not a source of vitamin B12. It is therefore a nutrient of concern for vegetarians and particularly for vegans who choose an entirely plant-based diet. **Materials And Methods:** This study was conducted as a prospective cross-sectional study, from August 2017 to march 2018, at Santhiram medical college, Nandyal, where in written informed consent was taken prior to the investigation after detailed information given to the participants regarding the study. Patients with history of alcohol consumption and history of consuming vegetarian diet were screened for anemia through a detailed history, examination and lab investigations. Suspected cases were admitted, investigated and treated if diagnosed.

Observations: The maximum incidence of alcoholics were in the age group 31-50 years.(143/185) 77%. Alcoholism was less common below 20years and above 65years. In present study among 185 alcoholics 146 (79%) were males and 39 (21%) were females. Among 315 non-alcoholics 204(65%) were males and 111(35%) females. The mean haemoglobin was 10.46 gms% among alcoholics and 12.31gm% among non-alcoholics.

In alcoholics, Various types of anaemia like 15% showed microcytic hypochromic, 26%macrocytic hypochromicanaemia, 17% dimorphic anaemia, 5% thrombocytopenia and 4% pancytopenia. In the controle group of 315 there were 76 vegetarians and 239 were Non Vegetarians and in study the mean haemoglobin was 8.89 gms % among vegetarians and 13.40gm%in non vegetarians. The lowest value being 4.9gm% and the highest being 17.7gm%.**Conclusion:** Alcoholism was more common among middle aged men and a feature of low socioeconomic group. Anemia was the predominant feature among chronic alcoholics severity of anemia was related to severity of alcoholic intake. In Peripheral smear study all types of anemia were seen in alcoholics. Haematological manifestations are reversible with cessation of alcohol. Vegetarians, are more likely to develop vitamin B12 defeciency and iron deficiency, and it is likely that anyone avoiding animal-based foods will eventually become deficient if their diet is not supplemented. All vegans, and lacto-ovo-vegetarians who don't consume adequate amounts of meat and dairy products or eggs to provide sufficient vitamin B12 and iron should therefore supplement their diet with vitamin B12 and iron from fortified foods or supplements.

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INTRODUCTION

The amount of alcohol capable of producing diseases depend on variety of factors including genetic predisposition malnutrition and concomitant viral infection of the liver. According to national council of alcoholism and drug dependence, alcoholism is a primary chronic disease with a

genetic, psycho social and environmental factors influencing its developmental manifestations. It is characterised by continuous or periodic impaired control over drinking over pre occupation with the drug alcohol and distortion in thinking most notably denial. Only 8-30% of chronic alcoholics develop alcoholic cirrhosis and minority of individuals will not progress beyond

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the stage of alcoholic fatty liver despite persistent drinking. Some of this variation in individual susceptibility.

MATERIAL & METHODS

It is a prospective cross sectional study of eight months duration. The data collected will be analyzed for descriptive statistical methods like frequency, distribution and association using Microsoft Excel Worksheet and SPSS for Windows. It included 185 patients who consumes alcohol and 315 patients who doesn't consume alcohol. 76 patients from non alcoholics who are strict vegetarians.

Inclusion Criteria

- All adult patients who are moderate alcoholics that is who consume alcohol less than 80 to 90 mg proof alcohol that is about 11 drinks per day or 80 mg of proof alcohol three or four times a week.
- All patients who are severe alcoholics that is who consume more than 80 to 90 mg proof alcohol daily or more than 11 drinks per day
- Patients attending Santhiram medical college, Nandyal.
- Adult patients who are non alcoholics taken as control.

Exclusion Criteria

- Adult patients who consume vegetarian;
- Patients with bleeding disorders and history of chronic bleeding and Patients with chronic kidney diseases, chronic infections and malignancies

OBSERVATIONS & RESULTS

The study period of two years between August 2017 to march 2018. During this period 500 adult patients were included in the study. Among which 185 were alcoholics and 39 were severe alcoholics, 79 patients who were moderate alcoholics and 67 were occasional alcoholics and 315 patients are taken as controls. Of the 315 patients 76 patients were vegetarians. The patients were included in the study after they fulfilled the inclusion criteria the information was collected according to the proforma.

Table 1 Age Incidence

Age in years	Alcoholics		Non-Alcoholics	
	No	%	No	%
21-30	27	14.0%	64	20.0%
31-40	54	29.0%	86	27.0%
41-50	62	34.0%	95	31.0%
51-60	30	16.0%	40	12.0%
>60	12	7.0%	30	10.0%
Total	185	100.0%	315	100.0%

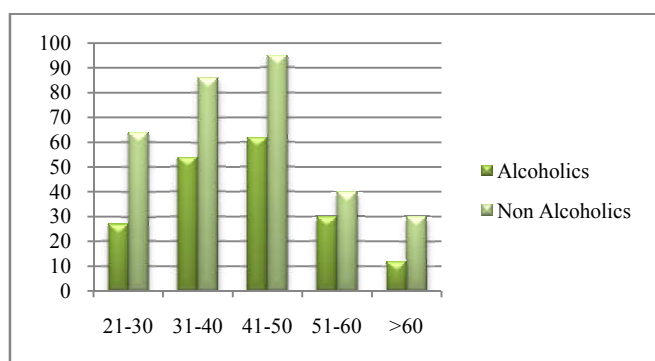


Figure 1 Age Incidence

In present study the maximum incidence of alcoholics were in the age group 31-50 years.(115/185) 62%. Alcoholism was un common below 20years and above 65years.

In a similar study done by T.Oduola *et al*³ age of patients ranged from 20 years to 57 years mean age being 36.04±11.28.

Table 2 Gender distribution of the study population

Gender	Alcoholics		Non Alcoholics	
	No	%	No	%
Male	146	79	204	65
Female	39	21	111	35
Total	185	100	315	100

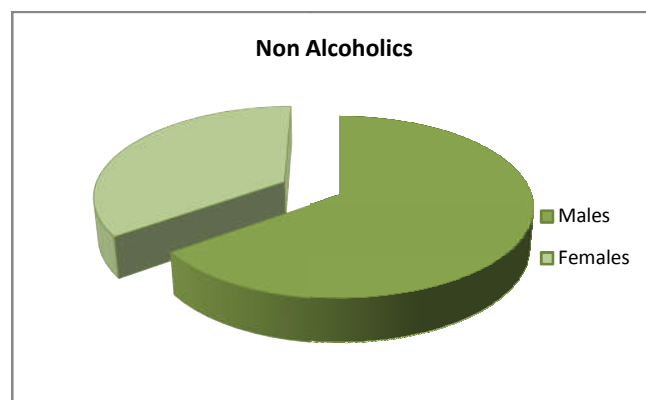
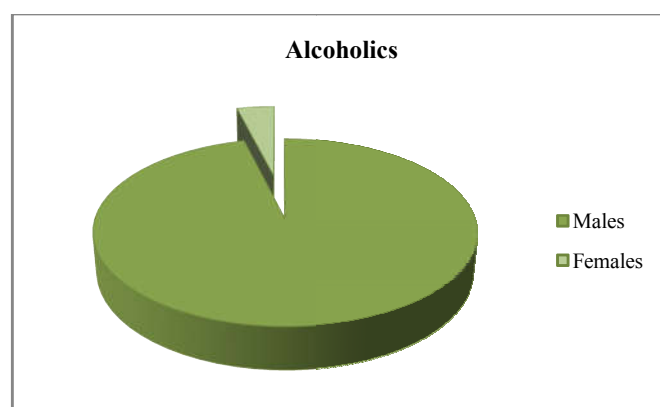


Figure 2 Gender distribution of the study population

In present study among 185 alcoholics 146 (79%) were males and 39 (21%) were females. Among 315 nonalcoholics 204(65%) were males and 111(35%) females. This shows an increasing trend of alcohol consumption in women also. In a study done by T.Oduola *et al*³, in Ile Ile at Nigeria out of 200(100%) all were men. In a study by Ray R *ET AL* 1988 from NIMHANS Bangalore all were 100% males. In a study conducted by Hislop *et al* 1983 in England male to female ratio of 2.9:1 was found.

Socio-Economic Status

In the present study most of the patients belonged to lower socio-economic status (181/185) 98%. About 2%(4/185) belonged to middle socio-economic status. Most of the patients from low socio-economic group are belonging to labour class. There is increased number of alcoholics in lower socioeconomic group as very poor patients are visiting our hospitals. Being poor they tend to consume low quality drink like arrack. In a survey done by Wilson *et al* 1980 showed a high incidence in low socioeconomic group?

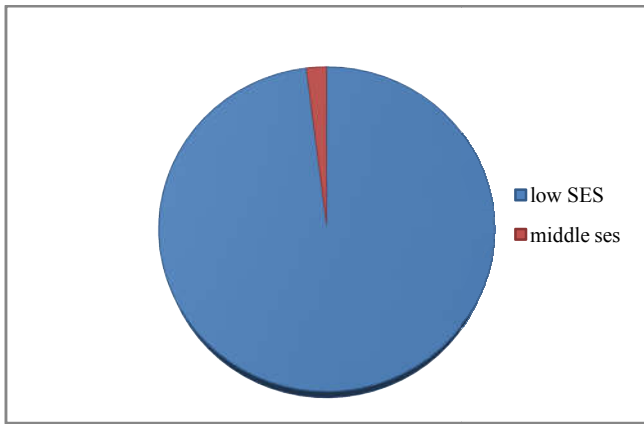


Figure 3 Socio – Economic Status

Table 4 Comparison of presenting complaints

Chief complaints	Alcoholics		Non-Alcoholics	
	No	%	No	%
Jaundice	126	68	96	30
Pain Abdomen	55	29	75	24
Dist Abdomen	91	49	40	13
BilatPedEdma	72	39	69	22
Hematesis	34	18	18	6
Malena	42	22	10	3
Fever	38	21	145	46
Altered sensorium	22	12	2	1
Breathlessness	19	10	77	25

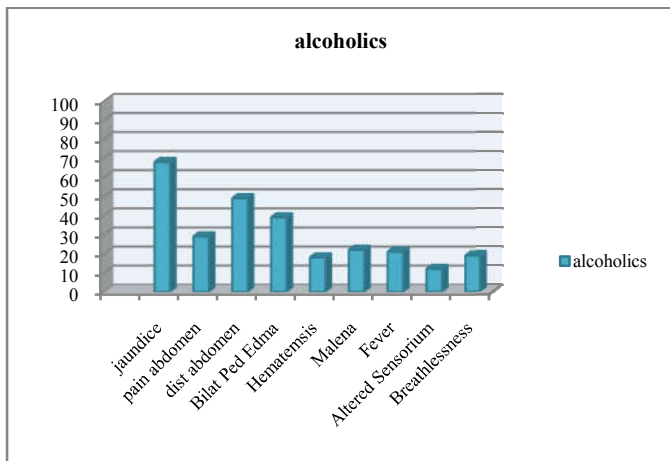


Figure 4 Symptomology of Patients with Alcoholic Liver Disease

In present study 68% (126/185) of patients presented with Jaundice. Next frequent presentation was with Abdominal distention 49% (91/185) 68%. Bilateral pedal edema 39% (72/185). Pain abdomen 29% (55/185), 18% haemetemesis (34/185), 22% malena(42/185) 10% breathlessness (19/185), 12% altered sensorium(22/185).

Table 5 Duration of alcohol

Duration in Alcohol	No	%
1-10 years	92	49
11-20 years	33	17
>20 years	15	8
Occasional	49	26
Total	185	100

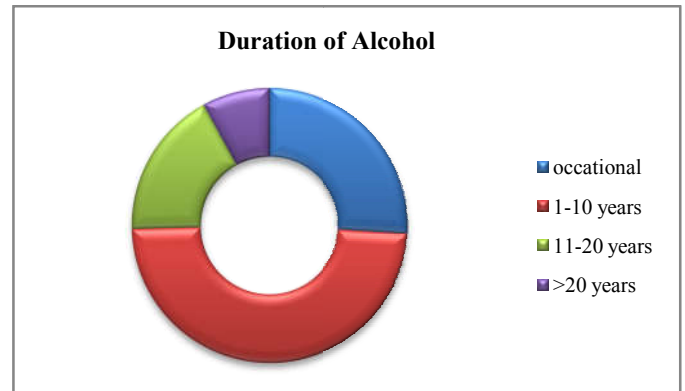


Figure 5 Duration of alcohol

The association of alcohol and liver disease has been established based on epidemiological studies. The present study shows Alcohol and its effects on haematological system.

In the present study the min duration of alcohol consumption was 5 years and maximum duration was more than 20 years. In our present study 49/185(26%) used to consume alcohol occasionally and 92/185(49%)were alcoholics for 5-9 years.33/185(17%) were alcoholics for 10 -19 years. 15/185(8%) were alcoholics for more than 20 years.

Table 6 General Physical Examination Clinical Examinations in Alcoholic Patients

On Examination	No (n=185)	%
Pallor	137	74
Icterus	118	64
Clubbing	58	31
Pededema	76	41
Parotid Swelling	34	18
Hepatomegaly	108	58
Ascites	97	52
Others	45	24

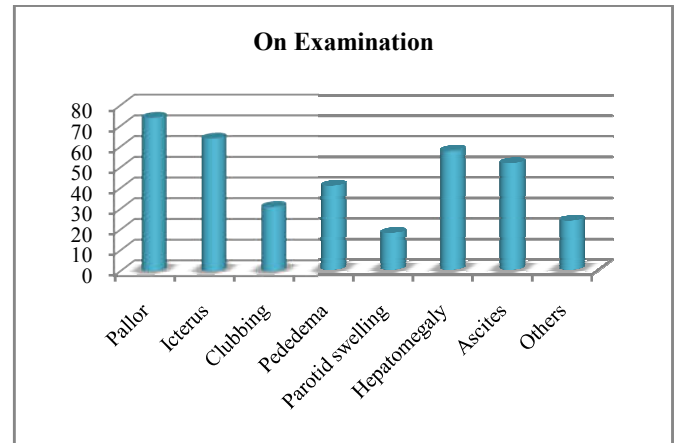


Figure 6 General Physical Examination

In present study about 137/185(74%) of alcoholics had pallor. The average haemoglobin percentage was 9.59gms%. Icterus was present in 118/185(64%). Pedal edema was present in 41%(76/185) of alcoholics. Clubbing was present in 31%(58/185). Parotid swelling was present in 18% (34/185) of patients. Other features of liver cell failure like loss of axillary hair, dupytrens contracture, breast atrophy and testicular atrophy were seen in 45/185(24%).

Table 7 Hemoglobin Levels in Moderate and Severe Alcoholic Cases

Hemoglobin levels	Moderate Alcoholic (n=92)	Severe Alcoholic (n=48)
<10 gms	67(72.9%)	38(79.1%)
>10 gms	25(27.1%)	10(20.9%)

P value is <0.0001 for Alcoholics and Non Alcoholics

In the present study the mean haemoglobin was 10.46 gms% among alcoholics and 12.31 gm% among non alcoholics.75% of the alcoholics had pallor. The lowest value being 3.2gm% and the highest being 17.4gm%.

The mean haemoglobin among moderate alcoholics was 9.69 and severe alcoholics was 9.01

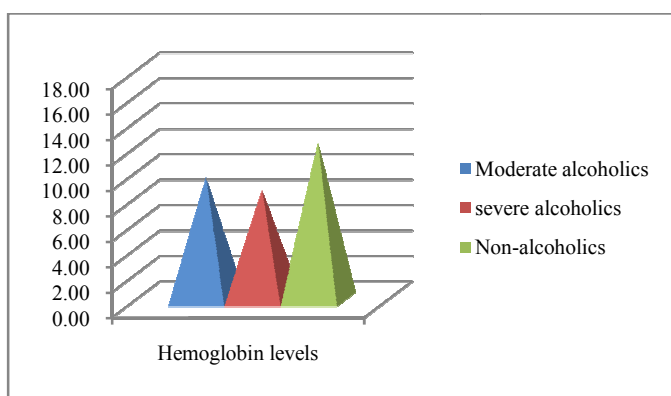


Figure 7 Hemoglobin Levels in Moderate and Severe Alcoholic Cases

Table 8 Comparison of Peripheral Blood Smear in Alcoholic and Non-alcoholic

Peripheral blood smear	Alcoholics (n=185)	Non alcoholics (n=315)
Normocytic, normochromic Anemia	13(7%)	23(7%)
Normal	48(26%)	197(63%)
Macrocytic anemia	48(26%)	32(10%)
Microcytic hypochromic Anemia	28(15%)	37(12%)
Dimorphic anemia	32(17%)	11(4%)
Thrombocytopenia	9(5%)	10(4%)
Pancytopenia	7(4%)	5(1%)

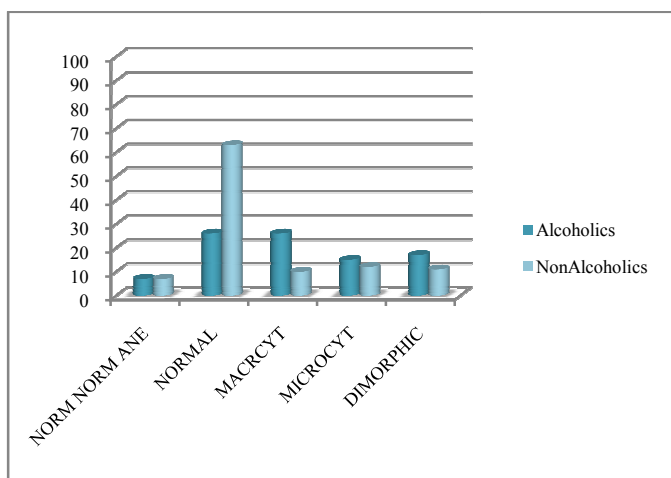


Figure 8 Comparison of Peripheral Blood Smear in Alcoholic and Non-alcoholic

Table 9 Peripheral Blood Smear in Moderate and Severe Alcoholic Cases

Peripheral Blood Smear	Moderate Alcoholics (n=92)	Severe Alcoholics (n=48)
Norm Norm Blood Picture	18(20%)	6(12%)
Normo Norm Anemia	13(14%)	8(16%)
Macrocytic Anemia	16(17%)	13(27%)
Micro Hypo Anemia	26(28%)	8(16%)
Dimor Ane	19(20%)	13(27%)

In the present study peripheral blood smear showed all types of anaemia. Normocytic normochromic anaemia was present in 34% of patients. Next predominant was macrocytic hypochromic anaemia which was present in 26% of patients. Microcytic anaemia was present in 15% patients. Dimorphic anemia was present in 17%. However even in non alcoholics 7% of patients also showed Normocytic normochromic anaemia.12% of non alcoholics showed microcytic hypochromic anaemia. Thrombocytopenia was present in 5% of alcoholics. Pancytopenia was present in 4% of patients.

Results of Anemia in Vegetarians and Non-Vegetarians

In the present study of the 315 controls of non alcoholics there were 76 vegetarians and 239 were non vegetarians and most of the vegetarians who are suffering from anemia are in the age group of 20-50 years. Of the 76 vegetarians 35 were females and 41 were males. Out of 76 vegetarians 63 had low haemoglobin levels and 13 were having normal haemoglobin levels.

Table 10 Hemoglobin Levels in Vegetarian and Non-Vegetarian Cases

Hemoglobin levels	Vegetarians (n=76)	Non Vegetarians (n=239)
>10	18	203
<10	58	33

P value is <0.0001

By conventional criteria this difference is considered to be extreme statistically significant.

In the present study the mean haemoglobin was 8.89gms% among vegetarians and 13.40gm%non vegetarians. The lowest value being 4.9gm% and the highest being 17.7gm%.

Table 11 Comparison of Peripheral Blood Smear in Vegetarians and Non Vegetarians

Peripheral blood smear	Vegetarians	Non vegetarians
Normocytic Normochromic Anemia	3	9
Macrocytic Anemia	21	11
Microcytichypochromic Anemia	34	4
Dimorphic Anemia	8	3
Normal	10	206
Thrombocytopenia	0	6

In the present study of the 76 vegetarians 34 were having microcytic hypochromic anemia and 21 were having macrocytic anemia and 8 of them were having dimorphic anemia and of the non vegetarians out of 239 patients 4 were having microcytic hypochromic anemia and 6 were having

macrocytic anemia and 3 of them were having dimorphic anemia..

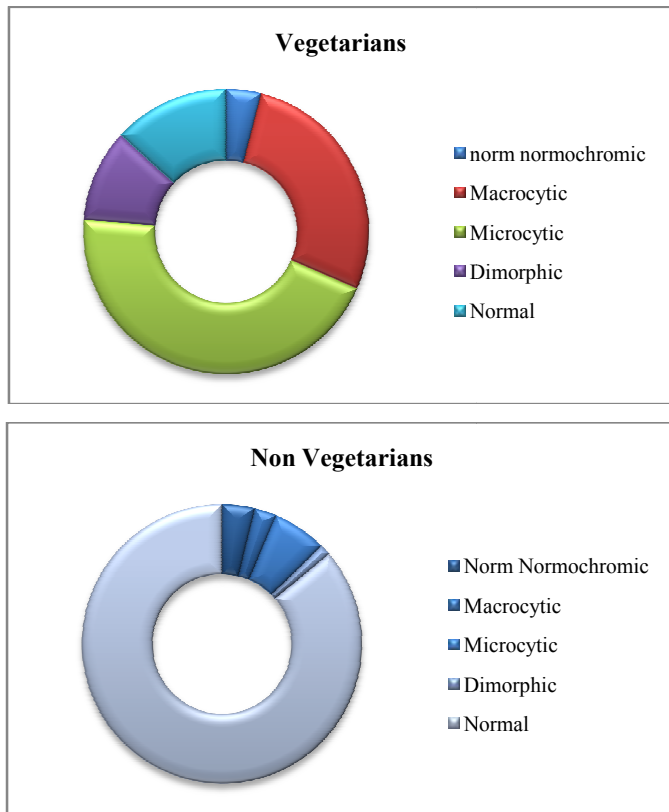


Figure 9 Comparison of Peripheral Blood Smear in Vegetarians and Non Vegetarians

In the present study of the 76 vegetarians 45% (34/76) were having microcytic hypochromic anemia, 28%(21/76) were having Macrocytic anemia, 10%(8/76) were having dimorphic anemia and 13%(10/76) were having normal smear picture.

DISCUSSION

In a study done by T.Oduola *et al*³ in Nigeria out of 200 patients age of patients ranged from 20 years to 57 years mean age being 36.04±11.28 years. In the present study the age of patients ranged from 20 years to 57 years mean age being 36.3 The maximum incidence of alcoholics were in the age group 31-50 years.(143/185) 77%. Alcoholism was less common below 20years and above 65years. This could be probably because middle age group people belonging to lower socioeconomic status are hard working and after hard stress and want to relax in the evening by taking alcohol. The maximum number of hematological abnormalities ieanemia was seen in age group of 31 to 50 years, In a study done by D.Chalmers *et al*⁴ in 1981 the mean age group was 59.9 years.

Gender Distribution

In present study among 185 alcoholics 146 (79%) were males and 39 (21%) were females. Among 315 non-alcoholics 204(65%) were males and 111(35%) females. This shows an increasing trend of alcohol consumption in women also. In a study done by T.Oduola *et al*³, in Ile Ile at Nigeria out of 200(100%) all were men. In a study by Ray R *ET AL* 1988 from NIMHANS Bangalore all were 100% males. In a study conducted by Hislop *et al* 1983 in England male to female ratio of 2.9:1 was found. In a similar study conducted by

D.Charmers *et al*⁴ in 1981 from Harrow showed a study of 219 out of which 146 were men 73 were females. The statistics show an extreme gender difference in consumption patterns. Prevalence among women has consistently been estimated at less than 5 per cent but is much higher in the northeastern States⁶.

Socio-Economic Status

In the present study most of the patients belonged to lower socio-economic status. In the present study (181/185) 98% were from lower class. Only about 2% (4/185) of alcoholics belonged to middle socio-economic status. Most of the patients from low socio-economic group are belonging to labour class. There is increased number of alcoholics in lower socioeconomic group as very poor patients are visiting our hospitals. Being poor they tend to consume low quality drink like arrack. In a similar survey done by Wilson *et al* in 1980 showed a high incidence in low socio-economic group’

Presenting Complaints

In present study 49% (91/185) of patients presented with distension of abdomen. Next frequent presentation was with jaundice (126/185)68%. Bilateral pedal edema 39% (72/185). Pain abdomen (55/185) 29% haemetemesis (34/185)18%, malena (42/185)22% breathlessness (19/185)10% altered sensorium (22/185) 12%.

In a study done by D.Chalmers *et al*⁴ gastrointestinal symptoms were predominant About 60% of patients presented with deudenal ulcer and dyspepsia. 20% of patients with haemetemesis. Jaundice in 20%. Altered sensorium in 10% of patients.

Duration of Alcohol Intake

In present study there were (15/185)8% of patients who consumed alcohol for more than 20 years. 5% were consuming alcohol for less than 5 years.

In the study conducted by D.Chalmers *et al*⁴ 219/373 were severe alcoholics for more than 10 years. In the study conducted by T.Oduola³*et al* 1200 patients were studied among which 50% were moderate alcoholics consuming for less than 10 years. 50% were severe alcoholic who consumed for more than 10 years.

Haematological Manifestations

In the present study the mean haemoglobin was 10.46gms% among moderate alcoholics and 12.31gm% among non alcoholics’ In study conducted by T.Oduala *et al*³ the haemoglobin (g/dl) was 14.5 ± 1.2 among moderate alcoholics and 14.8 ± 1.2 among severe alcoholics.

Peripheral Blood Smear

In the study by T.Oduola *et al*³ in severe drinkers they showed predominantly a macrocytic blood picture in peripheral blood smear. In the present study peripheral blood smear showed all types of anaemia. Normocytic normochromic anaemia was present in 34% of patients. Next predominant was macrocytic hypochromic anaemia which was present in 26% of patients. Microcytic anaemia was present in 15% patients. Dimorphic anemia was present in 17%. However even in non alcoholics 7% of patients also showed Normocytic normochromic

anaemia. 12% of non alcoholics showed microcytic hypochromic anaemia. Thrombocytopenia was present in 5% of alcoholics. Pancytopenia was present in 4% of patients.

In the study conducted by T.Oduola *et al*³ the platelet counts were above 2 lakhs normal in all groups. In our study 10% of our study group had thrombocytopenia out of which mean was 40,000cells/cumm. In a study conducted by Latvalajaana, Parkkila¹ 144 subjects were studied. There were 57 (40%) patients who showed a history of hazardous drinking and 87 patients who were nondrinkers. The incidence of anemia was 51% in the alcohol abusers, as compared with 69% of the nonalcoholics ($p < 0.05$). A diverse pattern of hematological effects was observed in the alcohol abusers.

In present study 50% of patients showed anemia among alcoholics and 25% of patients among nonalcoholics showed anemia.

In the study of Latvala Jaana^{1,2} blood smears showed macrocytes, stomatocytes, and knizocytes in alcoholics. In our study peripheral blood smear of alcoholics showed macrocytes spur cells and stomatocytes. In a study done by H. Koivisto, J. Hietala, P. Anttila⁸ out of 105 alcoholics 60% showed macrocytes in blood smear.

In study by Latvala Jaana and Parkkila^{1,2} thrombocytopenia was found in 41% of alcoholics. In a study done by H. Koivisto, J. Hietala, P. Anttila and Lynch *et al*^{7,8} out of 105 alcoholics 60% showed macrocytes in blood smear. In our study 10% of alcoholics had thrombocytopenia. In our study 10% of alcoholics had thrombocytopenia.

Incidence of Anemia in vegetarians compared with non vegetarians

Of the 315 controls of non alcoholics there were 76 vegetarians and 239 were non vegetarians and most of the vegetarians who are suffering from anemia are in the age group of 20-50 years. Of the 76 vegetarians 35 were females and 41 were males. Out of 76 vegetarians 63 had low haemoglobin levels and 13 were having normal haemoglobin levels.

In the present study the mean haemoglobin was 8.89 gms% among vegetarians and 13.40gm% among Non Vegetarians. The lowest value being 4.9gm% and the highest being 17.7gm%.

Peripheral Blood Smear in Vegetarians and Non Vegetarians

In the present study of the 76 vegetarians 34 were having microcytic hypochromic anemia and 21 were having macrocytic anemia and 8 of them were having dimorphic anemia and of the non vegetarians out of 239 patients 4 were having microcytic hypochromic anemia and 6 were having macrocytic anemia and 3 of them were having dimorphic anemia.

CONCLUSION

- Alcoholism was present in both in men and women. More common among men.
- Alcoholism was common in middle aged group
- Alcoholism predominately persisted in low socio economic group.

- Anemia is the predominant feature among chronic alcoholics. Anemia was independent of bleeding,
- Severity of anemia appear to be related to the severity of alcohol intake.
- There is an increased risk of infection among alcoholics.
- Microcytic hypochromic, macrocytic anemia, normocytic, normochromic anemia, all types of anemia can be seen in alcoholics.
- Macrocytes was predominately seen in peripheral blood smear.
- Thrombocytopenia was also a feature of chronic alcoholics.
- Haematological manifestations are reversible with cessation of alcohol
- Early detection of anemia among alcoholics can prevent further complications of anemia like failure.
- Early detection of haematological changes in alcoholics and treating them can prevent further complications and reduce the mortality in lower socioeconomic group of people.
- All the alcoholics are non vegetarians and alcoholics being vegetarians is very unlikely.
- Due to cultural practices followed by muslims alcoholism is uncommon in muslim community.
- Non alcoholics are less prone for development of anemia.
- Vegetarians are more likely to develop anemia compared to non vegetarians due to their dietary habits which contains low iron levels and absent vitamin B12 levels as the vit-B12 is mainly obtained from foods of animal origin.
- Microcytic hypochromic and Macrocytic anemia are common in vegetarians.
- All vegetarians need food supplementation in their diet as it is deficient in iron and vitamin B12.

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