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Research Article

Role of socio-demographic and cultural factors on anemia in a tribal population of North Kerala, India

Imaad Mohammed Ismail[1]*, Azeez Kahkashan[2], Alwin Antony[1], Sobhith VK[1]

[1]Department of Community Medicine, [2]Department of Physiology Kannur Medical College, Kannur, Kerala, India

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***Correspondence:**
Dr. Imaad Mohammed Ismail,
E-mail: imaad82@yahoo.com

ABSTRACT

Background: Anemia is a major public health problem in India, with an estimated prevalence of 38% to 82% in non-pregnant females and 18% to 59% in males. Anemia is a major cause for maternal mortality and chronic anemia leads to secondary organ damage such as congestive heart failure. Tribal people have been observed to have a higher prevalence of anemia and the factors causing it varies according to their geographical location and cultural practices; hence this study was undertaken with the objective of estimating the prevalence of anemia and identifying its risk factors among residents of Kannavam tribal area, Kerala, India.
Methods: It was a cross-sectional study conducted among tribal residents of Kannavam area from May 2014 to October 2015. Using convenient sampling 200 tribal people aged 18 years and above were selected, interviewed and sample collected. Anaemia was classified according to WHO criteria. Proportions, chi-square test and regression were used for analysis and p value less than 0.05 was considered to be significant.
Results: The mean (±SD) age of the study participants was 43 (±16) years. 43.5% study participants were males and the rest were females. The overall prevalence of anemia in the currently study is 51% (33.3% in males and 64.6% in females) which is much higher than the Kerala state prevalence rates. Increasing age and low socio-economic class were found to be common risk factors associated with anemia among both sexes whereas menorrhagia was found to be a significant factor in females.
Conclusions: The prevalence of anemia was high among both male and female tribal residents. Geriatric age group and low socio-economic status people were particularly vulnerable for developing anemia and special focus must be given to them while administering preventive and control measures.

Keywords: Anemia, Tribal population, Socio-economic class, Menorrhagia

INTRODUCTION

The world health organization defined anemia as a condition in which the number of red blood cells or their oxygen-carrying capacity is insufficient to meet physiologic needs which vary by age, sex, altitude, smoking, and pregnancy status.[1] Though the prevalence of anemia has gradually come down in the developed world, it still remains a major public health problem in most of the developing world. According to the WHO database anemia effects an 1.6 billion people worldwide which corresponds to 24.8% of the total world population.[1]

Globally the prevalence of anemia is 42% in pregnant women, 30% in non-pregnant women (15 to 50 years), 47% in preschool children, and 12.7% in men (older than 15 years).[2] In India, anemia is a major public health problem with an estimated prevalence of 38% to 82% in non-pregnant females and 18% to 59% in males.[3-7]

Anemia is a major cause for maternal and perinatal mortality; and chronic anemia leads to secondary organ damage such as congestive heart failure.[8-10] Anemia is not just a medical but also an important social problem as it leads to decreased work productivity and decreased earning.[11-13] It is a vicious cycle where poverty leads to anemia and in turn anemia aggravates poverty. The prevalence of anemia is more in rural areas as compared to urban area.[14,15] The prevalence further increases in marginalized population such as tribal population.[16,17] According to the 2011 census report, 10.4% of Indian population is made up of scheduled tribes.[18] The population of scheduled tribes in Kerala state is 4,84,839 (1.45% of the total state population).[18] Poverty, poor nutrition, illiteracy, adverse cultural practices, lack of awareness of the disease, lack of adequate geographic connectivity, lack of health personnel and services may be some of the factors contributing to higher prevalence of anemia in these tribal's. These marginalized populations receive the least amount of benefit of government schemes either due to ignorance or due to corruption.

It is important from the public health point of view to know the prevalence of anemia in these marginalized communities and to understand the risk factors associated with it as these form the basis of preventive intervention. There are many studies done on pregnant women and adolescent girls in urban and rural areas, but there are hardly any community level studies done to address this burning issue in adult population of tribal areas. Hence this study was undertaken with the objective of estimating the prevalence of anemia and identifying its risk factors among residents of Kannavam tribal area, Kerala.

METHODS

AIt was a cross-sectional study conducted among tribal residents of Kannavam, Kannur, North Kerala, India. The study period was from May 2014 to October 2015. Kannur is a major coastal city of North Kerala popular for its handloom industry. There is a large tribal belt having around 8150 residents in the eastern part of the district known as Kannavam tribal area from which the study sample was selected. The local tribal population is formed of two major sects, the Kurichyas and Paniyas. Sample size required for the current study was 186 (rounded to 200) and it was calculated using the formula $4pq/l^2$ (prevalence of 35% and relative precision of 20% was considered for sample size calculation at 95% confidence level). Written informed consent was taken from all study participants and ethical clearance was taken from institutional ethics committee of Kannur medical college.

Using convenient sampling 200 tribal people aged 18 years and above were selected, interviewed and sample collected. Exclusion criteria were pregnant women, individuals who had donated blood or received radiotherapy/chemotherapy in the past three months and individuals who are not willing to participate in the study or are unwilling to give a blood sample. Data collection was done using a semi-structured questionnaire. As Malayalam is the local language in Kerala, data was collected in Malayalam and later converted to English. Data on socio demographic variables, history of malaria, chronic illness, major bleeding, iron intake, tobacco smoking, alcohol consumption and menstrual history was collected. Venous blood sample was collected and transported to the central lab of the institute for analysis.

Anaemia was defined and classified according to WHO criteria.[1] For a non-pregnant adult female normal haemoglobin (Hb) is ≥12 gm/dl, mild anaemia is Hb 10-11.9 gm/dl, moderate anemia is Hb 7-9.9 gm/dl and severe anaemia is Hb <7 gm/dl. For an adult male normal haemoglobin (Hb) is ≥13 gm/dl, mild anaemia is Hb 10-12.9 gm/dl, moderate anemia is Hb 7-9.9 gm/dl and severe anaemia is Hb <7 gm/dl. Data entry and analysis was done on SPSS version 15. Proportions, chi-square test and regression were used for analysis and p value less than 0.05 was considered to be significant.

RESULTS

Table 1: Socio-demographic profile of the study population.

Variable	Frequency (n=200)	Percentage
Age in years		
20-29	44	22.0
30-39	55	27.5
40-49	38	19.0
50-59	27	13.5
60-69	21	10.5
70-79	7	3.5
80-89	8	4.0
Sex		
Male	87	43.5
Female	113	56.5
Marital status		
Never married	27	13.5
Currently married	141	70.5
Living separately	2	1.0
Widow/widower	30	15.0
Socio-economic class		
Class 1 (>5614)	7	3.5
Class 2 (2808-5614)	25	12.5
Class 3 (1685-2807)	44	22.0
Class 4 (842-1684)	54	27.0
Class 5 (<842)	70	35.0

A total of 200 tribal residents who met the selection criteria were interviewed and sample collected. 43.5% study participants were males and the rest were females (Table 1). The mean (±SD) age in years of the study participants was 43.02 (±15.99). Marriage is a norm in

that tribal community and hence 70.5% of them were found to be married at the time of study. 53% of the population had studied only up to primary school, 22.5% completed their high school and only 2.5% of them graduated from college.

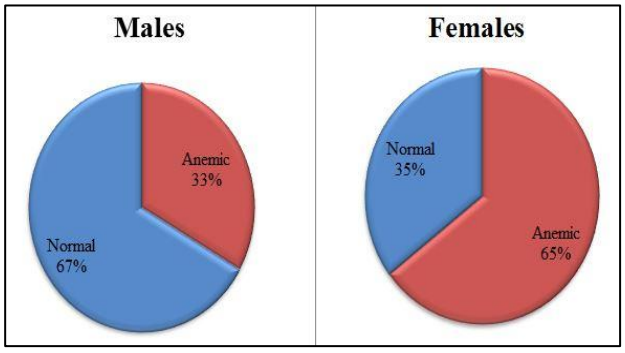

Figure 1: Prevalence of anemia in males and females.

A large proportion of study individuals (46.5%) were self-employed and were involved in jobs such as coolie worker, construction worker, shop keeper, auto driver and few of them worked in the field. It was observed that 8.5% of the individuals were able to work but were unemployed. Around 65% of the study participants had a per capita income of less than 1 dollar per day. With regard to socio-economic status of the study population it was observed that 35% of them belonged to class V (Low class) according to modified Prasad BG classification.

The overall prevalence of anemia in the study population was 51% (Table 2). The prevalence of anemia was 33.3% in males and 64.6% in females (Figure 1).

Table 2: Distribution of study population based on anemia status and gender.

Anemia status	Total	Males	Females
	Frequency (%)	Frequency (%)	Frequency (%)
Severe anemia (Hb <7 gm/dl)	1 (0.5)	0 (0.0)	1 (0.9)
Moderate anemia (Hb 7-9.9 gm/dl)	18 (9.0)	2 (2.3)	16 (14.2)
Mild anemia (Hb 10-11.9 gm/dl in females, Hb 10-12.9 gm/dl in males)	83 (41.5)	27 (31.0)	56 (49.6)
Non anemic (Hb ≥12 gm/dl in females, Hb ≥13 gm/dl in males)	98 (49.0)	58 (66.7)	40 (35.4)
Total	**200 (100)**	**87 (100)**	**113 (100)**

Table 3: Prevalence of anemia in different age groups.

Age group	Anemic No. (%)	Non-anemic No. (%)	Total
20-29 years	17 (40.5)	25 (59.5)	42
30-39 years	23 (38.3)	37 (61.7)	60
40-49 years	21 (60.0)	14 (40.0)	35
50-59 years	17 (63.0)	10 (37.0)	27
≥ 60 years	24 (66.7)	12 (33.3)	36
Total	**19 (32.8)**	**39 (67.2)**	**200**

Table 4: Bivariate analysis of study variables in males.

Variable	Total (n=87)	Anemic No. (%)	Non-anemic No. (%)	Odds ratio (95% CI)	χ^2 value	p value
Age ≥ 40 years	43	21 (48.8)	22 (51.2)	4.29 (1.62 - 11.35)	9.197	0.003*
Currently Married	64	16 (25.0)	48 (75.0)	0.25 (0.09 - 0.69)	7.565	0.009*
Education ≤ 10Std	57	20 (35.1)	37 (64.9)	1.26 (0.48 - 3.27)	0.229	0.632
Low socio-economic class	37	17 (45.9)	20 (54.1)	2.69 (1.17 - 6.72)	4.609	0.04*
Tobacco smoking	22	4 (18.2)	18 (81.8)	0.35 (0.11 - 1.17)	3.042	0.081
Alcohol consumption	58	19 (32.8)	39 (67.2)	0.92 (0.36 - 2.37)	0.026	0.872

*p value < 0.05

Table 5: Multivariate analysis of risk factors of anemia in males.

Risk factor	B	S.E	Wald	Odds ratio (95% C.I)	p value
Age ≥ 40 years	2.017	0.595	11.500	7.51 (2.34 - 24.12)	0.001*
Currently Married	-2.275	0.842	7.303	0.11 (0.02 - 0.53)	0.007*
Low socio-economic class	1.442	0.642	5.051	4.23 (1.20 - 14.87)	0.025*
Tobacco smoking	-0.893	0.748	1.424	0.41 (0.09 - 1.77)	0.233

*p value < 0.05

Table 6: Bivariate analysis of study variables in females.

Variable	Total (n=113)	Anemic No. (%)	Non-anemic No. (%)	Odds ratio (95% CI)	χ^2 value	p value
Age ≥40 years	58	44 (75.9)	14 (24.1)	2.81 (1.26 - 6.27)	6.607	0.011*
Currently married	77	51 (66.2)	26 (33.8)	1.24 (0.55 - 2.83)	0.282	0.674
Education ≤10Std	93	65 (69.9)	28 (30.1)	3.48 (1.28 - 9.44)	6.43	0.019*
Low socio-economic class	57	42 (73.7)	15 (26.3)	2.25 (1.11 - 4.97)	4.149	0.042*
Tobacco smoking	3	2 (66.7)	1 (33.3)	1.09 (0.09 - 11.50)	0.006	0.94
Alcohol consumption	4	2 (50.0)	2 (50.0)	0.53 (0.07 - 3.95)	0.387	0.614
More than 2 children	44	34 (77.3)	10 (22.7)	2.61 (1.18 - 6.12)	5.059	0.028*
Less than 2 years gap between pregnancy	70	44 (62.9)	26 (37.1)	0.81 (0.36 - 1.82)	0.245	0.688
Menorrhagia	20	17 (85.0)	3 (15.0)	3.74 (1.11 - 13.67)	4.422	0.041*
Metrorrhagia	5	2 (40.0)	3 (60.0)	0.34 (0.56 - 2.17)	1.385	0.344

*p value < 0.05

Table 7: Multivariate analysis of risk factors of anemia in females.

Risk factor	B	S.E	Wald	Odds ratio (95% C.I)	p value
Age ≥40 years	1.427	0.698	4.176	4.16 (1.16 - 16.36)	0.041*
Currently married	0.902	0.522	2.987	2.46 (0.88 - 6.86)	0.84
Education ≤10 Student	0.490	0.671	0.534	1.63 (0.44 - 6.08)	0.465
Low socio-economic class	1.368	0.521	6.896	3.92 (1.41 - 10.91)	0.009*
More than 2 children	1.111	0.726	2.343	3.03 (0.73 - 12.6)	0.126
Less than 2 years gap between pregnancy	0.49	0.537	0.835	1.63 (0.57- 4.67)	0.361
Menorrhagia	2.322	0.787	8.719	10.2 (2.18 - 37.65)	0.003*

*p value <0.05.

Increasing age and low socio-economic class were found to be significant risk factors associated with anemia among males (Table 4). Being married was found to be a protective factor from anemia (Table 5). Smokers had lesser prevalence of anemia compared to non-smokers but this was not found to be statistically significant (p 0.081). With regard to females increasing age, low socio-economic status, having more than 2 children and menorrhagia were found to be associated with anemia (Table 6).

Multivariate analysis of anemia in females revealed age more than 40 years, low socio-economic class and menorrhagia to be significantly associated with anemia. Habits such as smoking tobacco and alcohol consumption were not found to be associated with anemia in both males and females (Table 7).

DISCUSSION

Kerala is among the better performing states of the country and has the highest literacy rate and the better infant and maternal mortality rate.[19,20] The prevalence of anemia is lower in Kerala compared to other Indian states. According to NFHS 3 data of Kerala state, the prevalence of anemia in men is 8% and among women is 33%.[21] The overall prevalence of anemia in the currently study is 51% (33.3% in males and 64.6% in females) which is much higher than the Kerala state prevalence rates. Most of the cases were of mild anemia (81.37%) followed by a small proportion of population who had moderate anemia (17.64%).

The present study found prevalence of anemia to be significantly higher among people aged more than 40 years. Findings similar to the current study were also reported by Alem M et al. in Ethiopia where they found age more than 34 years to be a risk factor for anemia.[22] Females in the reproductive age group did not show higher prevalence of anemia when compared to those who have attained menopause. Among the geriatric population the prevalence of anemia was 67% which was much higher compared to the other age groups. The higher prevalence in elderly could be due to chronic diseases and iron deficiency but these needs to be studied further in future research.

Many previous studies have found illiteracy and lower level of education to be a contributor for having anemia.[3,16,23] In contrast to those, the present study found no association between education level and anemia in both males and females. However the current study found lower socio-economic status to be significantly associated with anemia among both genders. The present study used

modified Prasad BG socio-economic classification which is solely dependent on the income of the family. Lower income may lead to inadequate nutrient intake and also restricts the ability of the family to access the health services and interventions.[23] Former studies conducted in urban and rural setting in India have also found low socio-economic status to be very important risk factor of anemia.[3,4,22,24] Being currently married was found to be a protective factor from anemia among males. It may be attributed to the fact that they get better nutrition at home when compared to the unmarried and widower men.

Tobacco smoking is a known risk factor for development of anemia in the general population but in the study tribal population it was not found to be a risk factor.[5] Among males 25.3% were found to be current smokers (16.1% were predominantly cigarette and 9.2% predominantly beedi smokers). Among the females participants only 3 out 113 smoked and all three used beedi. Smoking tobacco products and consuming alcohol by women is not a part of their culture, hence the low prevalence of these habits among females. Smokeless tobacco consumption was found in 37% males and 18% females but this was not found be associated with anemia. A study conducted by Shrinivasa BM et al. among tribal women of Wynad district of Kerala had found pan chewing to be associated with anemia.[16] Kerala state has the highest per capita alcohol consumption in India. The present study found a high prevalence (66.7%) of alcohol consumption among males. Most of them used to consume alcohol on a daily basis. Regarding the women folk, the alcohol consumption was found to be negligible. There was no association between anemia and alcohol consumption.

In the study population it was observed that most tribal families had 2 to 3 children. 39% of the couples had more than two children. Bivariate analysis showed an association between anemia and having more than two children but on conducting a multivariate analysis there was no association. This may be accounted by the fact that as the number of children increased, the age of the mother also correspondingly increased and age is an independent risk factor of anemia. Unlike the present study, a study conducted by Melku M et al. found that having more number of children increased the risk for developing anemia.[25] Regarding the gap between deliveries, it was found that around two in three pregnancies had a gap of less than 2 years, but this was not found to be a risk factor for anemia.

Menorrhagia is a known risk factor of anemia in women.[26] The heavy loss of blood in them leads to iron deficiency anemia over a period of time. In the current study 18% of women were suffering from menorrhagia and among them 85% had anemia. Women who required more than two sanitary pads per day or had their menstrual bleeding for more than 7 days were considered to be suffering from menorrhagia. Four percent of women reported having metrorrhagia (bleeding at irregular intervals) and it was not found to be a risk factor of anemia.

CONCLUSION

The prevalence of anemia was found to be high among both males and females residents of the tribal area. Geriatric age group had a higher prevalence compared to other age groups. This highlights the fact that apart for traditional groups such as pregnant women and teenage girls, the preventative measures for anemia control should also include geriatric age group. The reasons for higher prevalence in the elderly tribal residents were not fully explored by the current study and can be taken up by future research.

People belonging to lower socio-economic class are particularly vulnerable for developing anemia and special focus must be given to this group while administering preventive and control measures. The study observed that level of education and family size had no direct significant bearing on anemia among Kannavam tribal population. As majority of women who had menorrhagia suffered from anemia, high priority must be assigned for its diagnosis and treatment among the tribal belt.

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