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Causes of anemia in pregnant women of the state of azad kashmir: A cross-sectional survey

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ABSTRACT

Background: Epidemic of anemia is considered to be a significant threat to pregnant women or women in child bearing age. Anemia is one of the major nutritional health disorders affecting significant proportion of population not only in developing countries but also in developed countries. This threat is more alarming in developing countries where poverty, illiteracy may contribute to high risk for causes of anemia. Objective: The purpose of the current study was to investigate the main causes of anemia in pregnant women in the State of Azad Kashmir, Muzaffarabad and to investigate the relationship between education and anemia. Methods: A descriptive cross sectional study was conducted over a sample of 433 pregnant women. The Chi-square test has been used to assess the statistical significance of different risk factors with Hb% (Heamoglobin) of the respondent. The multiple logistic regression model was used to get the most significant risk factors of anemia. Results: The study shows that the most dominant risk factors of the anemia were age at the time of marriage at different age categories that are 16 - 20 (OR = 3.945) (OR Odds ratios) with 95% C-I (confidence interval) (0.294 to 52.985), 21 - 25 (OR = 2.316) with 95% C-I (0.192 to 27.932) and 26 - 30 (OR = 4.179) with 95% C-I (0.347 to 50.320). Education at different education levels that is illiterate (OR = 1.191) with 95% C-I (0.005 to 87.279) and primary (OR = 1.179) with 95% C-I (0.009 to 156.200). Hb% at different levels 3 - 4 g/dl (OR = 1.220) with 95% C-I (0.299 to 4.984), 5 - 6 g/dl (OR = 2.221) with 95% C-I (0.679 to7.263) and 7 - 10 g/dl (OR = 1.384) with 95% C-I (0.408 to 4.689). Monthly income < 10,000 (OR = 2.296) 95% C-I (0.385 to 13.677), 11,000 - 15,000 (OR = 3.623) 95% C-I (0.678 to 19.31) and 16,000 to 20,000 (OR = 2.158) 95% C-I (0.441 to 10.563). Age of last child born 1 year (OR = 1.711) 95% C-I (0.399 to 7.341), 2 year (OR = 1.284) 95% C-I (0.304 to 5.421) and <1 year (OR = 2.224) 95% C-I (0.552 to 8.952). Daily eating habits, just like previous (OR = 2.415) 95% C-I (0.652 to 8.948), less than previous (OR = 3.671) 95% C-I (0.868 to 15.522). Previous history of miscarriage (OR = 1.258) 95% C-I (0.103 to 0.647), suffered in any hemorrhagic disease (OR = 1.529) 95% C-I (0.592 to 3.949). Nature of the work Exhaustive (OR = 1.961) 95% C-I (0.805 to 4.779).

Keywords: Odd Ratio; Logistic Regression; Anemia; Chi-Square; Pregnant Women

1. INTRODUCTION

Anemia is one of the major nutritional deficiency health disorders, affecting significant proportion of population. Although it effects all age groups but it is most prevalent in pregnant women. Anemia is pathological deficiency in oxygen carrying capacity of blood measured in hemoglobin concentration, red blood cells numbers. Blood is mainly composed of two parts 1) Plasma, constituting 55% of blood and 2) White blood cells, red blood cells & platelets.

Common causes of anemia are dietary deficiencies, inherited genetic defects, side effects of medicine, chronic diseases, blood loss from injuries and internal bleeding, destruction of red blood cells or insufficient red blood cells production. Causes of anemia depend upon its severity the more severe the anemia is the more likely the

chances of multiple reasons of anemia. Iron deficiency anemia is more common in pregnant because of increased need of iron for growing fetus. Women who start their pregnancy with low stored iron are at great risk to become anemic during the course of pregnancy.

Anemia is even common nutritional disorder of Industrialized nations but they have coped anemia through dietary improvement, prevention from malaria and improved technology. Anemia can be prevented by interventions of low cost like iron supplementation malarial prophylaxis and deworming [1].

Series of studies conducted in different parts of world shows that anemia is direct cause of 1% to 46% of maternal deaths [2].

In developing countries, causes of anemia in pregnancy are multifactorial. In pregnant women iron and folate deficiency anemia are common. These are related with nutritional deprivation intestinal worm infection. Hemolytic anemia is most common in malarial regions of developing countries. Severity of anemia can be greatly reduced by regularly prophylaxis of anemia during pregnancy [3].

Situation in Pakistan

Anemia particularly iron deficiency anemia is common in females of child bearing age and pregnant women in Pakistan. One of the findings of the study was that the anemia in Pakistan is more common in low socioeconomic group. Research conducted on selected anemic patients revealed that iron deficiency anemia is more common and risk factors of iron deficiency anemia are pregnancy (57%), nutritional inadequacy (36%) and others (7%) [4].

According to UNO pregnant women of low-income group have 56% anemia. Dietary habits of pregnant women affect the hemoglobin level. Anemia is also associated with parity & gravidity of women. 82.10% diagnosed anemic pregnant women were those who have poor dietary intake [5].

Study shows that about 15% of pregnant women experiences medical & obstetric complication. MMR (Maternal mortality rate) is 276 per 100,000 births annually. This can be reduced by poverty reduction and empowerment of women [6].

Anemia is more common in Pakistan, particularly in women with no previous antenatal checkup and it is more common in women of low socioeconomic group. In urban areas of Pakistan 90.5% of pregnant women were anemic among them 0.7% were severely anemic [7].

The anemia in pregnant women is directly associated with nutritional deprivation moreover it is associated with low socioeconomic status and educational level [8].

It was recommended that to reduce anemia education is vital if we really want to break dietary ignorance affecting significant number of population residing in rural areas where there nutritious food are in abundant quantity and they sell it in very low price [9].

Current study aimed at finding out the contributory factors of anemia in pregnant women due to some physiological changes and many other possible reasons.

2. METHODOLOGY

A descriptive cross sectional study was conducted in Muzaffarabad district after approval by the Ministry of public education in Azad Jammu & Kashmir Muzaffarabad. A sample of 433 pregnant women based on convenient sampling technique was taken (women that visited hospital Abbas Institute of Medical Sciences (AIMS).

2.1. Data Collection

An epidemiological questionnaire was developed. The questionnaires were distributed to well train staff nurses who collected the information from the women in period of one month or more. The questionnaires were filled by face to face interview. Close ended questionnaire was used and level was that of for layman's understanding. A non probability sampling technique (Convenience Sampling) was used to collect the data.

2.2. Ethical Approval

This study was approved by the authorities of the Ministry of public education Azad Jammu & Kashmir.

2.3. Inclusion and Exclusion Criteria

The inclusion criterion was only choosing pregnant women for the survey on the other hand all non-pregnant women were excluded from the current study.

2.4. Analysis

Data were entered in a spread sheet and analyzed using the SPSS software version 16. The descriptive statistics was used to check the response regarding causes of anemia. The Chi-square test was used to check the association between dependent variable (Hb%) and independent variables and the Multiple Logistic Regression model was performed to find out the most significant risk factors of anemia.

3. RESULTS AND DISCUSSION

As discussed earlier that sample size of 433 pregnant women were selected for the current study. A questionnaire was distributed among them (see **Table 1**). These women were classified on the basis of their educational level *i.e.* illiterate, primary, middle, matric and interme-

Table 1. Questionnaire about causes of anemia in pregnant women.

1	Age of the respondent	a. 15 - 20 b. 21 - 25 c. 26 - 30 d. 31 - 35 e. Above 35	
2	Age at the time of marriage	a. Less than 15 b. 16 - 20 c. 221 - 25 d. 26 - 30 e. Above 30	
3	Education of the respondent	a. Illiterate b. Primary c. Middle d. Matric e. Intermediate	
4	Number of children you have?	a. 1 - 3 b. 4 - 7 c. above 7	
5	Type of pregnancy	a. Single b. Twin c. Triple d. Quarterplet	
6	Hb% of the respondent	a. 3 - 4 g/dl b. 5 - 6 g/dl c. 7 - 10 g/dl d. above 10 g/dl	
7	LFTs of the respondent	a. < Normal b. Normal c. More than normal	
8	Gestational month	a. 1 - 3month b. 4 - 5 month c. 6 - 7 month d. 8 - 9 month	
9	Age of last children born	a. <1 year b. 1 year c. 2 year d. Above 2 year	
10	Type of family you have?	a. Nuclear b. Joint c. Extended d. any other	
11	Monthly income of the household?	a. <10,000 b. 11,000 - 15,000 c. 16,000 - 20,000 d. Above 20,000	
12	Current status of the respondent?	a. House wife b. Doing job c. Both A and B	
13	Eating habits of the respondent?	a. 2 times a day b. 3 times a day c. 4 times a day d. More frequently	
14	Daily tea intake of the respondent?	a. Once a day b. Twice a day c. Thrice a day d. More frequent	
15	How often you eat fresh fruits, vegetables and milk?	a. Daily b. 2 times week c. Weekly d. Very rare	
16	Are you using any sort of iron supplement?	a. Yes b. No	
17	Are you suffering from frequent nausea and vomiting?	a. Yes b. No	
18	Your daily eating habits are:	a. Just like previous b. Double then previous c. Less than previous	
19	Do you know that pregnant women need double diet?	a. Yes b. No	
20	Your average hour of rest per day?	a. 5 - 6 hours b. 7 - 8 hours c. Above 8 hours	
21	Do you know about cheap alternatives of healthy diet?	a. Yes b. No	
22	Do you have previous history of miscarriage?	a. Yes b. No	
23	Are you suffering from any sort of hemorrhagic disease (APH)?	a. Yes b. No	
24	Nature of work you daily done?	a. Light and normal b. Exhaustive	
25	Are you suffering from any sort of stress or worry?	a. Yes b. No	
26	Do you think after attending regular visits to doctor you feel quite better than previous?	a. Yes b. No	

diate. Majority of the respondent (42.5%) were illiterate, 25.9% were having primary education, 19.2% were of middle level, 11.3% were matric and 1.2% were of intermediate level (see **Table 2**).

A relationship between education level and anemia has been investigated. It was observed that there is almost linear but negative relationship between different education level and disease of anemia *i.e.* as education level decreases incidence of anemia increases (see **Figure 1**). In present study it was observed that anemia is more prevalent in women of low educational level. This may be attributed due to lack of knowledge of illiterate women. We have also investigated causes of anemia in pregnant women. To check the association of Hb% with different variables the chi-square test was applied. Results showed that all the variables are strongly associated with Hb% of the respondent only three of them have not shown association with Hb% that are (previous history of miscarriage, suffered in frequent nausea and vomiting and suffered in any hemorrhagic disease) each of these three have p-value > 0.05 the level of significance. And all the remaining variables showed highly association with Hb% of the respondents that is each of these have p-value <0.05 the level of significance (as can be seen from **Table 3**), which indicate that they are strongly associated with Hb% of the respondents.

Table 2. Frequency of different education level of the respondents.

	Frequency	**Percentage (%)**
Illiterate	184	42.5
Primary	112	25.9
Middle	83	19.2
Matric	49	11.3
Intermediate	5	1.2
Total	**433**	**100.0**

In order to take the feedback of pregnant women regarding causes of anemia, a questionnaire was distributed among them. Feedback of the pregnant women is mentioned in the **Table 4**. It can be seen from the **Table 4**, that 40.2% of the respondents were in the age group of 26 - 30 years, 11.2% in the age group of 15 - 20 years, 21% in the age group 21 - 25 years whilst 16.4% and 10.6% were in the age category of 31 - 35 and above 35 years respectively.

About 18.2% of the respondents have Hb% level between 3 - 4 g/dl, 21% between 5 - 6 g/dl, 34.2% between

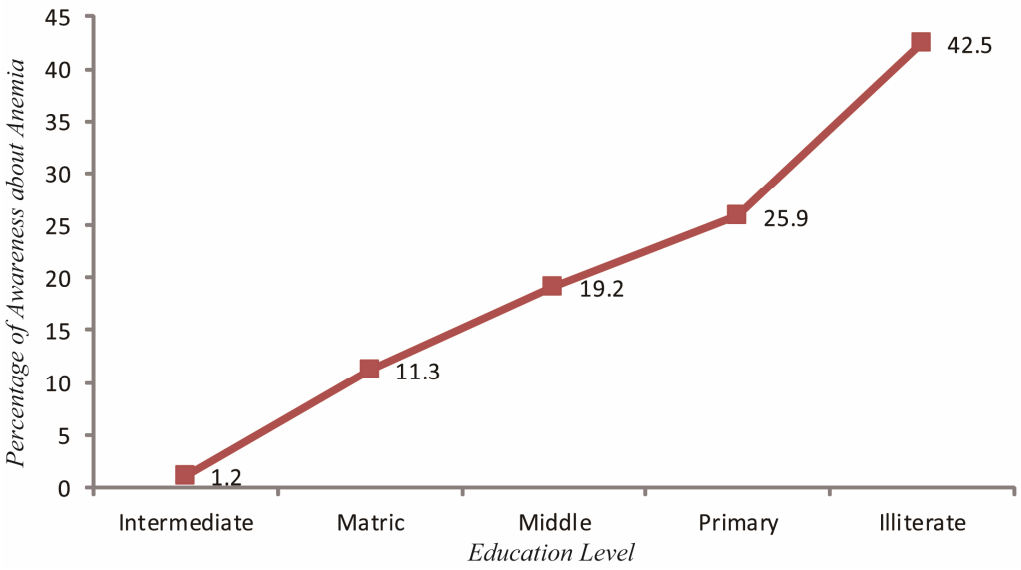

Figure 1. Respondent education level and trend of anemia.

Table 3. Results of Chi-square test for association of Hb% with different variables.

Variables	Chi-square value	p-value
Hb% of the respondent * age	80.550	0.000
Hb% of the respondent * age at the time of marriage	53.907	0.000
Hb% of the respondent * education of the respondent	60.113	0.000
Hb% of the respondent * no. of children you have?	57.584	0.000
Hb% of the respondent * type of pregnancy	1.7962	0.000
Hb% of the respondent * LFTs of the respondent	33.563	0.000
Hb% of the respondent * Gestational month	88.485	0.000
Hb% of the respondent * age of last child born	69.142	0.000
Hb% of the respondent * type of family you have?	21.339	0.011
Hb% of the respondent * Monthly income of the household?	62.354	0.000
Hb% of the respondent * current status of the respondent	34.365	0.000
Hb% of the respondent * eating habits of the respondent	39.991	0.000
Hb% of the respondent * daily tea intake of the respondent	27.116	0.001
Hb% of the respondent * you are eating fresh fruits, vegetables and milk	74.408	0.000
Hb% of the respondent * you are using any sort of iron supplement	37.755	0.000
Hb% of the respondent * are you suffering from frequent nausea and vomiting	4.809	0.186
Hb% of the respondent * your daily eating habits are	12.457	0.053
Hb% of the respondent * do you know that pregnant vomen need for double diet	25.667	0.000
Hb% of the respondent * your average hour of rest per day	1.0512	0.000
Hb% of the respondent * do you know about cheap alternatives of healthy diet?	24.697	0.000
Hb% of the respondent * do you have previous history of miscarriage?	2.097	0.552
Hb% of the respondent * are you suffering from any hemorrhagic disease (APH)?	6.799	0.079
Hb% of the respondent * nature of work you daily done	18.756	0.000
Hb% of the respondent * are you suffering from any sort of stress or worry?	27.987	0.000
Hb% of the respondent * what do you think after attending regular visits to doctor you feel quite better then previous?	16.294	0.001

7 - 10 g/dl and about 26.6% have Hb% level above 10 g/dl. lft of the respondents at different level was 24% having less than normal, majority of the respondents (68%) had normal lft and 7.6% respondents had more than normal lft. Gestational months of the respondents were 1 - 3 months (21.2%), 4 - 5 months (27%), 6 - 7 months (19.2%), and 8 - 9 months (32.6%). Most of the women (40%) had last child born age less than 1 year, 24.2% respondents with 1 year, 22.6% with 2 year and 13.2% have more than 2 years. 43% of the women were belonged to nuclear family, 39% joint, 11.1% extended family and 6.9% were belonged to any other family.

Table 4. Response of respondents about causes of anemia in pregnant women.

Questions		Response in percentage (%)	
Age	15 - 20	51	11.8
	21 - 25	91	21.0
	26 - 30	174	40.2
	31 - 35	71	16.4
	above 35	46	10.6
Age at the time of marriage	Less than 15 years	75	17.3
	16 - 20 years	238	55.0
	21 - 25 years	75	17.3
	26 - 30 years	33	7.6
	above 30 years	12	2.8
No. of children you have?	1 - 3	203	46.9
	4 - 7	116	26.8
	above 7	114	26.3
Type of pregnancy	single	270	62
	Twin	92	21.2
	Triple	67	15.5
	Quarterplet	04	0.9
Hb% of the respondent	3 - 4 g/dl	79	18.2
	5 - 6 g/dl	91	21.0
	7 - 10 g/dl	148	34.2
	above 10 g/dl	115	26.6
LFTs of the respondent	<then normal	104	24.0
	Normal	296	68.4
	more than normal	33	7.6
Gestational month	1 - 3 month	92	21.2
	4 - 5 month	117	27.0
	6 - 7 month	83	19.2
	8 - 9 month	141	32.6
Age of last child born	<1 year	173	40.0
	1 year	105	24.2
	2 year	98	22.6
	above 2 year	57	13.2
Type of family you have?	nuclear	186	43.0
	Joint	169	39.0
	Extended	48	11.1
	any other	30	6.9
Monthly income of the household?	<10,000	146	33.7
	11,000 - 15,000	208	48.0
	16,000 - 20,000	48	11.1
	Above 20,000	31	7.2
Current status of the respondent	House wife	263	60.7
	Doing job	126	29.1
	Both A and B	44	10.2
Eating habbits of the respondent	2 times a day	147	33.9
	3 times a day	247	57.0
	4 times a day	30	6.9
	More frequently	9	2.1

Continued

Daily tea intake of the respondent	Once a day	159	36.7
	Twice a day	189	43.6
	Thrice a day	57	13.2
	More frequent	28	6.5
You are eating fresh fruits, vegetables and milk	Daily	197	45.5
	2 times week	131	30.3
	Weekly	62	14.3
	Very rare	43	9.9
You are using any sort of iron supplement	Yes	229	52.9
	No	204	47.1
Are you suffering from frequent nausea and vomiting	Yes	264	61.0
	No	169	39.0
Your daily eating habits are	Just like previous	287	66.3
	Double then previous	98	22.6
	Less than previous	48	11.1
Do you know that pregnant women need for double diet	Yes	285	65.8
	No	148	34.2
Your average hour of rest per day	5 - 6 hours	201	46.4
	7 - 8 hours	147	33.9
	Above 8 hours	85	19.6
Do you know about cheap alternatives of healthy diet?	Yes	282	65.1
	No	151	34.9
Do you have previous history of miscarriage?	Yes	195	45.0
	No	238	55.0
Are you suffering from any hemorrhagic disease (APH)?	Yes	205	47.3
	No	228	52.7
Nature of work you daily done	Light and normal	307	70.9
	Exhaustive	126	29.1
Are you suffering from any sort of stress or worry?	Yes	208	48.0
	No	225	52.0
Do you think after attending regular visits to doctor you feel quite better than previous?	Yes	282	65.1
	No	151	34.9

Monthly income of the respondents were <10,000 (33.7%), 11,000 - 15,000 (48%) 16,000 – 20,000 (11.1%) and above 20,000 (7.2%). Majority of the women *i.e* (60.7%) were housewives while 29.1% doing job and 10.2% fall in other category. Daily eating habits of the respondents show that about 33.9% take meal twice a day while 57% respondents enjoy it 3 times. Data shows that 6.9% respondents 4 times and 2.1% respondents take meal more frequently in a day. Similarly 36.7% of respondents take tea once in a day while 43.6% twice in a day whereas 13.2% thrice in a day and 6.5% take tea more than thrice time. 45.5% of the respondents eat fresh fruits, vegetables and milk daily, 30.3% twice in a day, 14.3% weekly and 9.9% rarely. About 52.9% women were using iron supplement and 47% said they have never used iron supplement. 61% of the women have suffered from nausea and vomiting. Average hour of the rest per day of the 46.4% of women were 5 to 6 hours, 33.9% respondents were 7 - 8 hour and 19.6% respondents above 8 hour. The women who had previous history of miscarriage were about 45%. About 47.3% of the women were suffered in hemorrhagic disease (APH).

The **Table 5** shows the results of multiple logistic regression models with odd ratios and their 95% confidence interval. The logistic regression model was performed to check the potential of anemia in the presence of different risk factors. To perform this the variable eating double diet of the respondent was considered as binary response namely (yes, no) and all the remaining were considered as independent variables at different levels as can be seen from **Table 5**. The results showed that anemia is more dominant in the age group 21 - 25 and above 35 years that is 1.067 times and 1.817 times more likely to have anemia with 95% C-I (0.210 and 5.429) and (0.485 and 6.799) respectively than the reference age group that is 15 - 20 the age group 26 - 30 and

Table 5. Prevalence rate of Anemia and effects of different potential risk factors in pregnant women in the population of Muzaffarabad Azad Kashmir.

Independent Variables		OR	(95% CI)	
Age	15 - 20[r]	1		
	21 - 25	1.067	0.210	5.429
	26 - 30	0.447	0.101	1.986
	31 - 35	0.403	0.110	1.469
	Above 35	1.817	0.485	6.799
Age at the time of marriage	Less then 15 years[r]	1		
	16 - 20 years	3.945	0.294	52.985
	21 - 25 years	2.316	0.192	27.932
	26 - 30 years	4.179	0.347	50.320
	Above 30 years	0.714	0.049	10.460
Education of the respondent	Intermediate and above[r]	1		
	Illiterate	1.191	0.005	87.279
	Primary	1.179	0.009	156.200
	Middle	0.637	0.009	162.826
	Matric	0.489	0.004	67.561
No. of children you have	Above 7[r]	1		
	1 - 3	0.285	0.099	0.820
	4 - 7	0.465	0.163	1.325
Type of pregnancy	quarterplet[r]	1		
	Single	0.306	0.060	1.569
	Twin	0.146	0.026	0.815
	Triple	0.134	0.022	0.820
Hb% of the respondent	Above 10 g/dl[r]	1		
	5 - 6 g/dl	2.221	0.679	7.263
	7 - 10 g/dl	1.384	0.408	4.689
	3 - 4 g/dl	1.220	0.299	4.982
LFTs of the respondent	<then normal[r]	1		
	Normal	1.695	0.710	4.047
	More then normal	3.852	0.894	16.596
Gestational month	1 - 3 month[r]	1		
	4 - 5 month	1.314	0.434	3.978
	6 - 7 month	0.728	0.253	2.093
	8 - 9 month	0.765	0.257	2.281
Age of last child born	Above 2 year[r]	1		
	1 year	1.711	0.399	7.341
	2 year	1.284	0.304	5.421
	< 1 year	2.224	0.552	8.952
Type of family you have	nuclear[r]	1		
	Joint	0.871	0.368	2.064
	Extended	0.788	0.213	2.923
	any other	0.080	0.014	0.447
Monthly income of the household?	Above 20,000[r]	1		
	11,000 - 15,000	3.623	0.678	19.361
	16,000 - 20,000	2.158	0.441	10.563
	<10,000	2.296	0.385	13.677
Current status of the respondent	House wife[r]	1		
	Doing job	0.929	0.224	3.844
	Both A and B	1.155	0.240	5.555

Continued

Eating habits of the respondent	2 times a day[r]	1		
	3 times a day	0.356	0.044	2.913
	4 times a day	0.252	0.031	2.075
	More frequently	0.282	0.027	2.905
Daily tea intake of the respondent	Once a day[r]	1		
	Twice a day	2.473	0.569	10.757
	Thrice a day	1.555	0.330	7.318
	More frequent	5.808	1.181	28.565
You are eating fresh fruits, vegetables and milk	Daily[r]	1		
	2 times week	0.467	0.112	1.953
	Weekly	0.445	0.099	2.005
	Very rare	0.433	0.090	2.075
You are using any sort of iron supplement	Yes [r]	1		
	No	0.320	0.146	0.704
Are you suffering from frequent nausea and vomiting	Yes[r]	1		
	No	0.305	0.143	0.652
Your daily eating habits are	Double than previous[r]	1		
	Just like previous	2.415	0.652	8.948
	Less then previous	3.671	0.868	15.522
Your average hour of rest per day	5 - 6 hours[r]	1		
	7 - 8 hours	1.993	0.558	7.112
	Above 8 hours	0.324	0.078	1.349
Do you know about cheap alternatives of healthy diet?	yes[r]	1		
	No	0.055	0.023	0.131
Do you have previous history of miscarriage?	No[r]	1		
	Yes	1.258	0.103	0.647
Are you suffering from any hemorrhagic disease (APH)?	No[r]	1		
	Yes	1.529	0.592	3.949
Nature of work you daily done	Light and normal[r]	1		
	Exhaustive	1.961	0.805	4.779
Are you suffering from any sort of stress or worry?	Yes[r]	1		
	No	0.317	0.140	0.718
Do you think after attending regular visits to doctor you feel quite better then previous?	Yes[r]	1		
	No	0.606	0.282	1.305

31 - 35 having less chances of anemia as the odd ratio is less than 1 *i.e* OR (0.447, 0.403) and 95% C-I (0.101 to1.986) and (0.110 to 1.469) respectively. Similarly the respondents age at the time of marriage was also showed that the occurrence of anemia in the age group 16 - 20 years, 21 - 25 years, 26 - 30 years were 3.945 times, 2.316 times and 4.179 times more as compared with age group less than 15 years and the value of odd ratio of age group above 30 years is 0.714 which is also positively linked with anemia. The 95% C-I for these age groups are shown in the above **Table 5**. The education of the respondent is also a significant determinant it can be observed that are illiterate and primary were 1.191 times and 1.179 times more likely to have anemia as compared with educated women that is intermediate and matric. The 95% C-I for different education level were also showed in the above table. The number of children and type of pregnancy also showed positive association with anemia. LFT of the women was also observed as a strong determinant for anemia that is the women having normal and more than normal LFT were 1.695 and 3.852 times more chances to have suffered in anemia as compared with women less than normal LFT. The 95% C-I was also showed. Another dominant risk factor of the anemia was Hb% of the respondents it was observed that women having Hb% level 5 - 6 g/dl, 7 - 10 g/dl and 3 - 4 g/dl were 2.221 times,1.364 times 1.220 times more likely to have anemia as compared with above 10 g/dl Hb% level, the 95% C-I was also calculated. Gestational months and type of the family of the respondents were also showed positive link with anemia. Monthly income of the respondents household was also observed as a strong indi-

cator for the occurrence of anemia the results showed that the house hold income 11,000 - 15,000, 16,000 - 20,000 and <10,000 were 3.623 times, 2.158 and 2.296 times more chances of anemia as compared with respondents income above 20,000 so income is a very important factor for anemia. The 95% C-I for different income level was also shown in **Table 5**. The results revealed that current status of the respondent, daily eating habits, daily tea intake, use of fresh vegetables, fruits, use of iron supplement and suffered frequently in nausea and vomiting were also showed positive association with anemia. It was observed that the women having diet less than previous and just like previous were 3.671 times and 2.415 times more chances to have anemia as compared with women having diet double than previous. Average hour of rest per day and respondent who know cheap alternative of healthy diet were also important for anemia. The women having previous history of miscarriage were 1.258 times more likely to have anemia as compared with women have no miscarriage. Similarly the women who ever suffered in the disease hemorrhagic disease were 1.529 times more chances of anemia as compared with women who never suffered in such disease. It was observed that the women who done exhaustive work 1.961 times more likely to be anemia as compared with women who have normal and light work, so nature of the work is also a vital indicator for the occurrence of anemia. The results showed that the women who suffered in any worry or stress and who regular visited to the doctor were also positively associated with anemia.

The **Figures 2** and **3** showed the probabilities of all the independent variables in the above **Table 4** and it can be observed that all the variables are positively associated with anemia.

4. SUMMARY AND CONCLUSION

The main aim of the study was to find out the relationship of education with increase rate of anemia and to find out the most common causes of anemia in pregnant

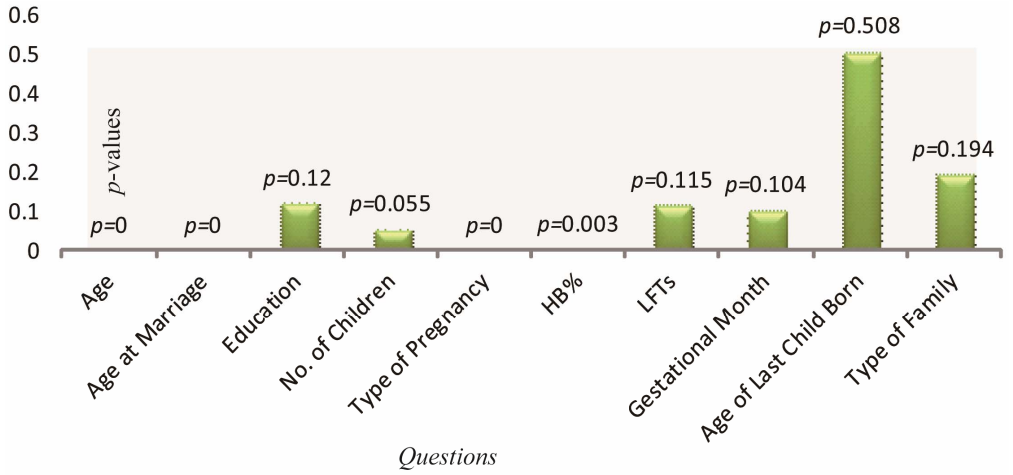

Figure 2. Causes of Anemia in pregnant women.

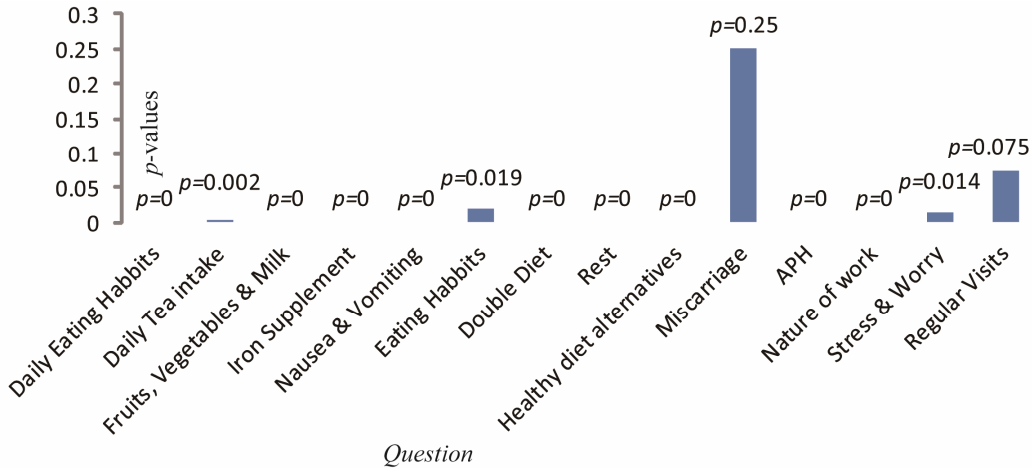

Figure 3. Causes of Anemia with respect to daily activities and food.

women. The sample of 433 pregnant women was selected from Abbas Institute of Medical Sciences (AIMS) Muzaffarabad. It was observed that there is linear but negative relationship between education and anemia. By using chi-square, it was found that all the factors are highly associated with Hb% of the women except three that are suffered in frequent nausea and vomiting, previous history of miscarriage and suffering of any hemorrhagic disease. So Hb% of the respondent is a strong indicator of the anemia. By the results of odd ratios, there were found that the anemia is most prevalent in the age group 21 - 25 years (OR = 1.067), similarly the age at the time of marriage the values of odd ratio at different age group 16 - 20 (OR = 3.945), 16 - 20 (OR = 2.316) and 26 - 30 (OR = 4.179) shows that how strongly associated age at the time of marriage. The values of odd ratios for education level *i.e* illiterate and primary (OR = 1.191, OR = 1.179) times more likely to have anemia. The results showed that the women having Hb% 3 - 4 g/dl, 5 - 6 g/dl and 7 10g/dl (OR = 2.221, OR = 1.384, OR = 1.220) times more chances of anemia as compared with women having above 10 g/dl. Similarly the number of children, gestational month, LFT, age of last children, type of family and eating habits are also associated with anemia. Income of the house hold was also observed as a strong factor of anemia the results of odd ratios showed that the house hold income < 10,000 (OR = 3.623), 11,000 - 15,000 (OR = 2.158) and 16,000 - 20,000 (OR = 2.296) times more chances of anemia as compared with having income above 20,000. The results showed that average hour of rest per day, cheap alternative of healthy diet, previous history of miscarriage, suffered in hemorrhagic disease, nature of the work, suffered in stress or worry and regular visited to the doctor also showed the significant results. It can be concluded that the proper education of the women can help them to get awareness about the causes of anemia. Anemia can also be prevented by the intervention of low cost iron supplement.

Moreover at government or at semi government level the well trained lady health workers should be involved to launch a campaign to create awareness about the causes of anemia. Mass media or print media can also campaign to raise the bar of knowledge in women. Socio economic conditions in our poor society are also one of the main causes of anemia. In our knowledge this is the first research on that particular issue in AJ & K Muzaffarabad.

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