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RESEARCH ARTICLE

PREVALENCE, RISK FACTOR AND MANAGEMENT OF ANEMIA WITH PREGNANCY AMONG WOMEN ATTENDING ANTENATAL CARE CLINIC IN WAD MADANI TEACHING HOSPITAL

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Abstract

Background Anaemia in pregnancy is defined as haemoglobin concentration less than 11.0 g/dl. Globally, anaemia affects half a billion women of reproductive age. Anaemia during pregnancy is a public health problem especially in developing countries and is associated with adverse outcomes in pregnancy

Objective To study the prevalence, risk factors and management of anemia with Pregnancy among women attending antenatal care clinic in Wad Madani Teaching Hospital (October 2021 to March 2022).

Methods A prospective descriptive cross sectional hospital based study was conducted in Wad Medani Teaching Hospital ANC clinic during the period from October 2021 to March 2022 and covered all pregnant women in antenatal period . Data collected, prepared, entered and analyzed using SPSS version 25.0.

Results This study covered 353 participants (pregnant women). Concerning the anaemia characteristics, the study showed that the prevalence of anaemia was 162 (45.9%), and 11 (6.8%) had severe anaemia, 42 (25.9%) moderate, and 109 (67.3%) mild anaemia. All anaemic patients received a dietary intake correction advice, 79 (48.8%) iron supplementation and only 10 (6.2%) received blood transfusion. The analysis found that the prevalence of anaemia was significantly higher among pregnant women with extreme ages (less 20 years and above 40 years), lower education, rural residence, higher parity, third trimester, irregular antenatal care visits, and with positive history of anaemia with p values < 0.05.

Conclusion and recommendation Our study concludes that the occurrence of anemia among pregnant women is high and should not be ignored, and the associated factors must be taken into consideration, to improve the prevention and management policies of this serious problem among pregnant women in Sudan.

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Introduction:-

Of pregnancy complications anemia is considered as one of the important complications that complicate pregnancy in the under-developed populations.⁽¹⁾ According to the World bank ranking, anemia occupies the eighth place in the diseases that affects women and young girls in the under-developed countries.⁽²⁾

The incidence of anemia in under-developed countries ranges between 40-60% mainly centered in Asia (60%) and Africa (52%) of which 1-5% were severe form of anemia^[3]. However, these incidences could be far less than the real situation in these countries due to the lack of accurate recording in these parts of the world^[4].

There are variation between women and regions in awareness about iron deficiency anemia and its prevention^[5]. Sufficient awareness about anemia will lead to increase intake of supplementation by women during their pregnancy and post-partum period which decrease the incidence of anemia in pregnancy^[6].

Studies in Sudan reported that pregnant women of eastern Sudan are more susceptible to anemia regardless their age or parity⁽⁷⁾ and anemia associated with adverse maternal and perinatal outcomes^(8,9).

For all that this study aimed to assess the level of knowledge about causes, symptoms and prevention of iron deficiency anemia among women of reproductive ages in Kassala, eastern Sudan and also their practices to prevent that type of anemia.

Studies showed that among anemia in pregnancy iron deficiency anemia is most common type (almost 75%) followed by folic acid deficiency, which is more dominant in women with dietary deficiency or not taking supplementation of iron and folic acid during pregnancy.⁽¹⁰⁾

Anemia is diagnosed whenever hemoglobin level drops below 11 grams/dl in early pregnancy and below 10 grams/dl in the middle or late pregnancy.⁽¹¹⁾

From other hand hemoglobin below 6 grams/dl is considered as severe form of anemia and it has association with poor maternal and fetal outcome. Complications of severe anemia are premature labor, miscarriage, fetal growth restriction, and intrauterine fetal demise, which are not commonly seen in mild and moderate iron deficiency anemia⁽¹¹⁾

Anaemia in pregnancy is a rich area of study in which several researches were conducted as a reflection of the significance of the problem, for example:

Makhoul et al assessed risk factors associated with severe anemia [hemoglobin (Hb) < 8.0 g dl(-1)] and poor iron status among Nepali pregnant women.⁽¹²⁾

Also Bencaiova et al in Switzerland assessed the prevalence of decreased iron stores and anemia in pregnant women. To determine whether the risk factors: socio-demographic background, age, BMI, and parity are associated with abnormal hemoglobin concentrations and/or abnormal iron status.⁽¹³⁾

Study in Porgal assessed the prevalence of iron deficiency anemia and the risk factors for iron depletion during the first half of pregnancy, in a Portuguese population. Two hundred and one women were included, from which five (2.49%) presented anemia.⁽¹⁴⁾ Additionally, 77 (38.3%) exhibited iron deficiency and 22 (10.9%) revealed severe iron depletion. Maternal age was the only risk factor identified. The odds ratio (OR) was equal to 12.99 (95% CI 2.41 - 70.0) for women under twenty years of age and 2.09 (95% CI 1.05 - 4.14) for women older than thirty years of age.

Tanzanian study determined the prevalence, risk factors, and adverse perinatal outcomes of anaemia among pregnant women in Moshi Municipal, Northern Tanzania. A total of 529 women were included in this analysis.⁽¹⁵⁾ Their mean age was 25.8 (SD 5.73). The prevalence of anaemia was 18.0% and 2% had severe anaemia. The clinic of recruitment and low education level of the women were the factors that were independently associated with anaemia during pregnancy. At delivery, there were 10 stillbirths, 16 low birth weight (LBW) newborns, and 2 preterm birth cases. No association was found between anaemia and LBW, preterm birth, or stillbirths.

Other study from Sudan, by **M A Abdelgadir** et al on the prevalence and associated factors of anaemia among pregnant women in Gezira state. In this study, out of the 292 women, 119 (40.8%) had anaemia (HB < 11 g/dl); eight (2.7%) had severe anaemia (HB < 7 g/dl). One patient had a positive blood film for malaria. A total of 38 (13.0%) out of the 292 pregnant women had *S. mansoni* infections. While age, parity, gestational age, education, occupation, interpregnancy interval and BMI were not associated with anaemia, pica (OR = 1.7, 95% CI = 1.0-2.9, p = 0.02) and *S. mansoni* infections (OR = 2.8, 95% CI = 1.2-6.7, p = 0.01) were significantly associated with anaemia using univariate and multivariate analyses. The high prevalence of anaemia among these women needs to be controlled through preventive measurement of *S. mansoni* infections and health education to prevent practicing pica.⁽¹⁶⁾

Objectives:-

General Objective

To study the prevalence, risk factors and management of anemia with Pregnancy among women attending antenatal care clinic in Wad Madani Teaching Hospital (October 2021 to March 2022).

Specific objectives

1. To determine the prevalence of the anemia with pregnancy among women attending antenatal care clinic in Wad Madani Teaching Hospital (October 2021 to March 2022).
2. To determine the risk factors of anemia among women attending antenatal care clinic in Wad Madani Teaching Hospital (October 2021 to March 2022).
3. To evaluate management of anemia among women attending antenatal care clinic in Wad Madani Teaching Hospital (October 2021 to March 2022).

Study design

A prospective descriptive cross-sectional hospital-based study.

Study area

The study was conducted in Wad Medani Teaching Hospital which is main hospital of health care services for the whole state and also to the nearby states.

Study population

The study population was all pregnant women attending in Wad Medani Teaching Hospital ANC clinics during the period.

Inclusion criteria

Pregnant women in the first, second and third trimester of pregnancy attending ANC unit in Wad Medani Teaching Hospital.

Exclusion criteria

All patients who didn't agree to be included in the study.

Sample size and sampling technique

Sample size

The sample size was selected according to inclusion criteria from women in the first, second and third trimester of pregnancy attending ANC unit in Wad Medani Teaching Hospital, which was calculated with help of formula.

$$n = t^2 \times p(1 - p) / m^2$$

n= required sample size

p= assumed prevalence (0.75)

t= confidence level at (95%) (Standard value of 1.96)

m=margin of error at (5%) (Standard value of 0.05)

$$n = ((1.96 \times 1.96 \times 0.75) \times (1 - 0.75)) / 0.05 \times 0.05$$

$$= (3.842 \times 0.1875) / 0.0025 = 353$$

Accordingly, sample size was 353 women fulfill the inclusion criteria of the study.

Sampling technique

Participants who were seen personally in different obstetrics clinics and history about causes of anemia were undertaken management of anemia as well.

Data collection tools

This was done through a questionnaire, checked by the authors at the end of each day and subsequently coded to ease analysis, and then coded data were entered into the prepared data sheets into the computer.

Study variables

Independent variables in this study were:

1. Age Residence
2. Occupation
3. Educational level
4. Parity
5. Gestational age
6. Frequency of ANC visits.
7. Causes of anemia
8. Management of anemia

Dependent variables in this study were

HB level

Statistical analysis:

Data was tabulated and analyzed using the Statistical Package for Social Sciences (SPSS). Chi square test was used and significance differences (P) was adjusted with confidence interval (CI) 95% (P < 0.05 significant, P > 0.05 not significant). Results were analyzed, discussed and recommendations suggested.

Ethical considerations

1. Ethical clearance from SMSB Ethical Committee.
2. Written consent was obtained from the hospital administrations.
3. Written consent was obtained from the ladies.
4. Confidentiality of data collected was considered (No names, data and coded. Data was interpreted in form of statement tables & figures).

Results:-

This study covered 353 participants (pregnant women). More than half of patients 183 (51.8%) were 21 – 30 years in age with mean age of 28 ± 8.2 years as in table (1).

| Age – years | Frequency | Percent (%) |
|---------------|------------|--------------|
| < 20 years | 79 | 22.4 |
| 21 – 30 years | 183 | 51.8 |
| 31 – 40 years | 69 | 19.5 |
| > 40 years | 22 | 6.2 |
| Total | 353 | 100.0 |

Table (1):- The distribution Anemia in Pregnancy among women attending antenatal care Clinic in Wad Madani Teaching Hospital according to their age – years (n = 353 pregnant women).

Only 54 (15.3%) of patients did not receive any type of formal education and less than third of the 114 (32.3%) were from rural residential areas as detailed in tables (2), and figure (1) Moreover, the more than half of patients 205 (58.1%) were housewives as in table (3).

Table (2):- The distribution Anemia in Pregnancy among women attending antenatal care Clinic in Wad Madani Teaching Hospital according to their education (n = 353 pregnant women).

| Education | Frequency | Percent (%) |
|------------|-----------|-------------|
| Illiterate | 54 | 15.3 |
| Primary | 79 | 22.4 |

| | | |
|---------------------|------------|--------------|
| Secondary | 117 | 33.1 |
| University or above | 103 | 29.2 |
| Total | 353 | 100.0 |

Figure (1):- The distribution Anemia in Pregnancy among women attending antenatal care Clinic in Wad Madani Teaching Hospital according to their residence (n = 353 pregnant women).

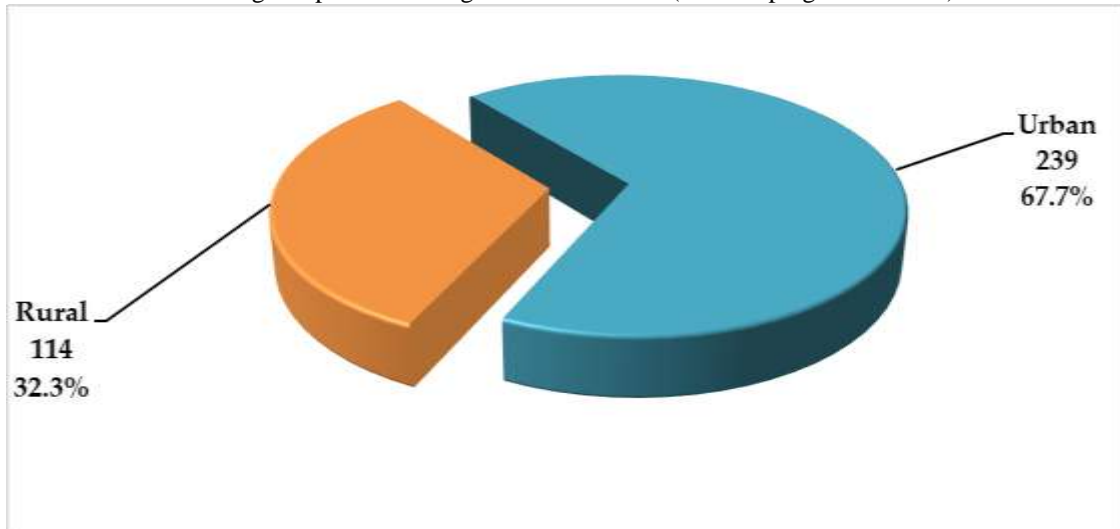


Table (3):- The distribution Anemia in Pregnancy among women attending antenatal care Clinic in Wad Madani Teaching Hospital according to their occupation (n = 353 pregnant women).

| Occupation | Frequency | Percent (%) |
|-------------------|------------|--------------|
| Housewife | 205 | 58.1 |
| Worker | 60 | 17.0 |
| Employee | 39 | 11.0 |
| Private bossiness | 28 | 7.9 |
| Other | 21 | 5.9 |
| Total | 353 | 100.0 |

Clinically, 205 (58.9%) were multigravidas, nearly two thirds of them 222 (62.9%) reported that the age of their youngest children were less than two years as in Figures (2,3).

Figure (2):- The distribution Anemia in Pregnancy among women attending antenatal care Clinic in Wad Madani Teaching Hospital according to their parity (n = 353 pregnant women).

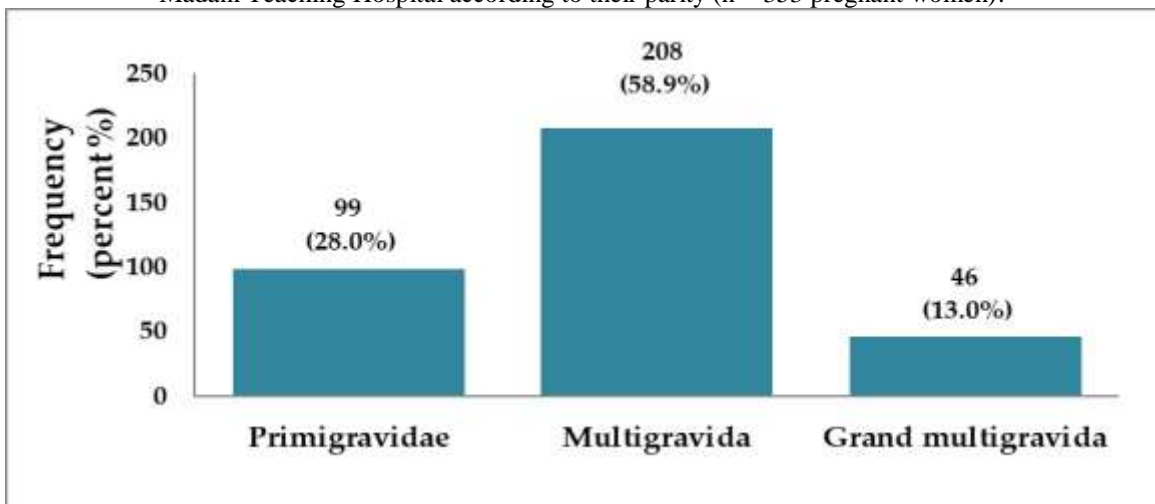
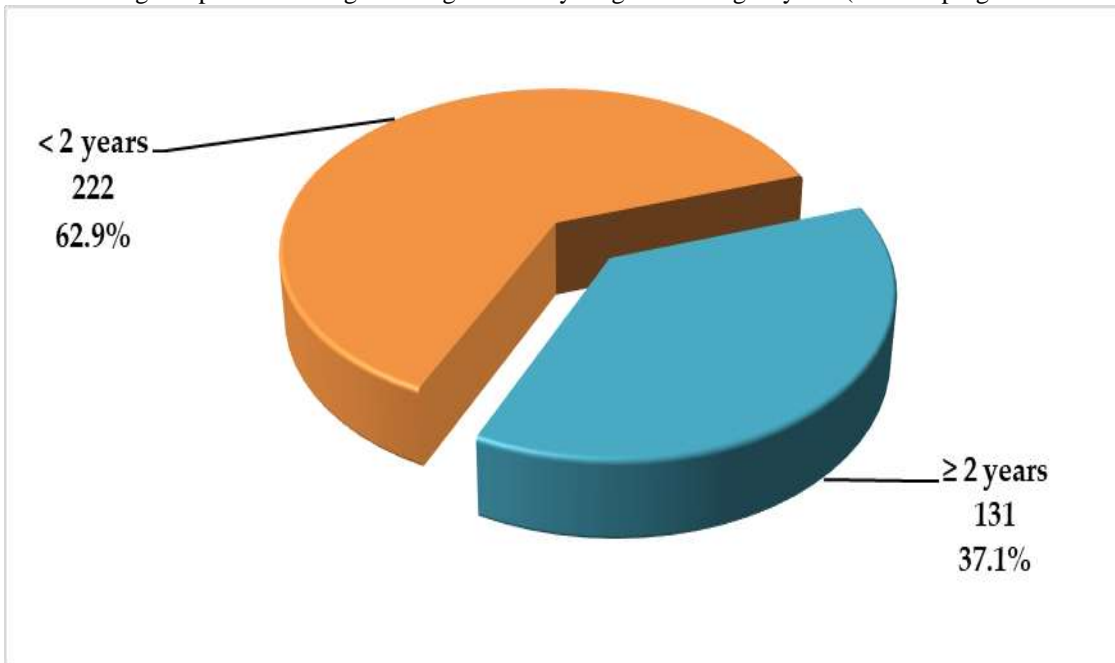
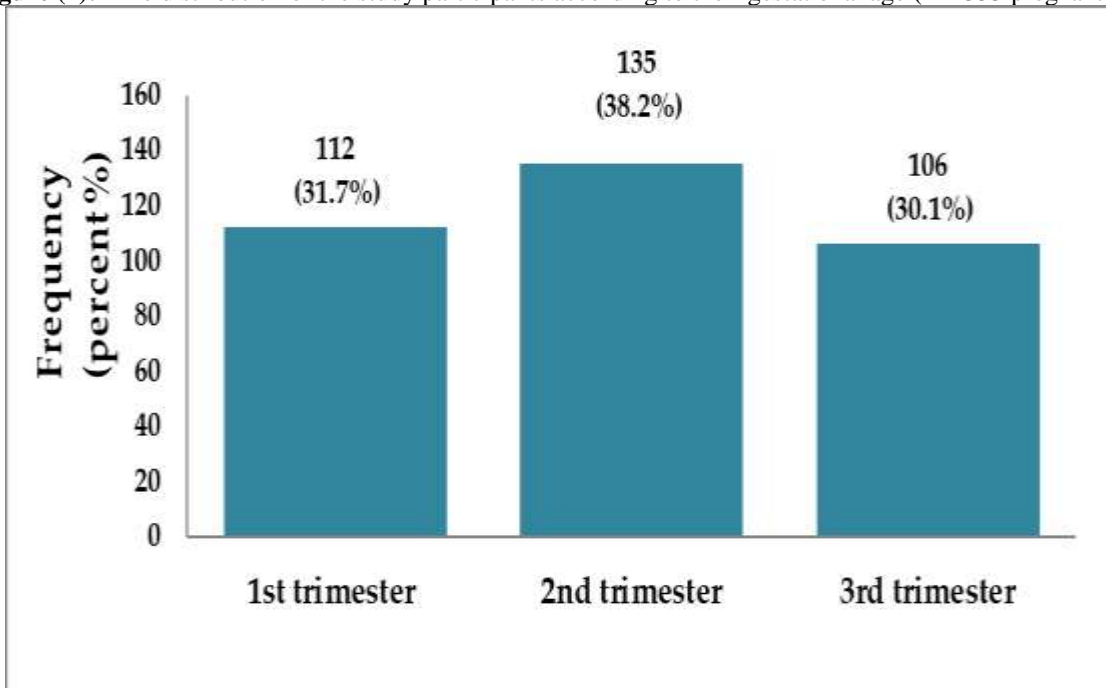


Figure (3):- The distribution Anemia in Pregnancy among women attending antenatal care Clinic in Wad Madani Teaching Hospital according to the age of their youngest child age - years (n = 353 pregnant women).



Only third of the patients 112 (31.7%) were in the first trimester, while 106 (30.1%) in the third trimester as in Figure (4).

Figure (4):- The distribution of the study participants according to their gestational age (n = 353 pregnant women).



Only 27 (7.6%) reported malaria infection within the current pregnancy, 11 (3.1%) worm infestation, and 18 (5.1%) schistosomiasis as in table (4)

Table (4):- The distribution Anemia in Pregnancy among women attending antenatal care Clinic in Wad Madani Teaching Hospital according to their history of infections in current pregnancy (n = 353 pregnant women)

| History of infections | Frequency | Percent (%) |
|-----------------------|------------|--------------|
| Malaria | 27 | 7.6 |
| Worms | 11 | 3.1 |
| Schistosomiasis | 18 | 5.1 |
| Others | 3 | 0.8 |
| None | 294 | 83.3 |
| Total | 353 | 100.0 |

On clinical examination, 147 (41.6%) were pale, 21 (5.9%) jaundice and 9 (2.5%) had splenomegaly as shown in table (5).

Table (5):- The distribution of the study participants according to their main findings in the clinical examination (n = 353 pregnant women).

| Main examination findings | Frequency | Percent (%) |
|---------------------------|-----------|-------------|
| Pallor | 147 | 41.6 |
| Jaundice | 21 | 5.9 |
| Edema | 18 | 5.1 |
| Splenomegaly | 9 | 2.5 |
| Fever | 6 | 1.7 |

Only 189 (53.5%) had regular antenatal care, 47 (13.3%) had positive past history of anaemia and 7 (14.9%) reported haemoglobinopathies, while 51 (14.4%) had positive family history of anaemia as showed in Figures (5,6,7 and 8).

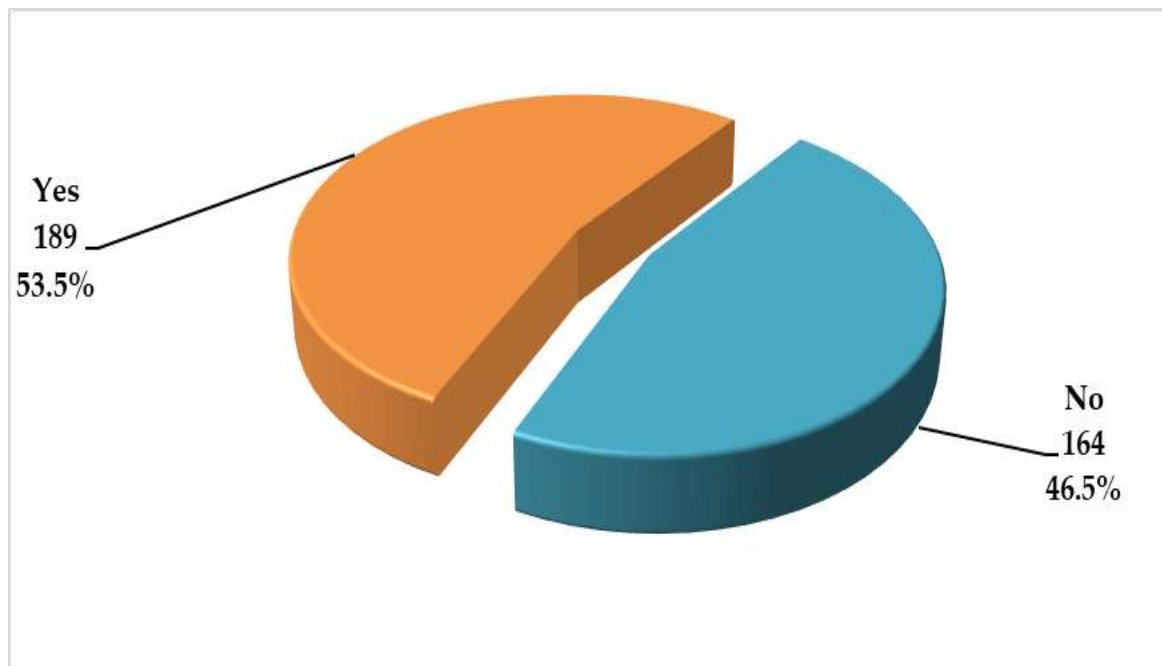


Figure (5):- The distribution of the study participants according to the antenatal care regularity (n = 353 pregnant women)

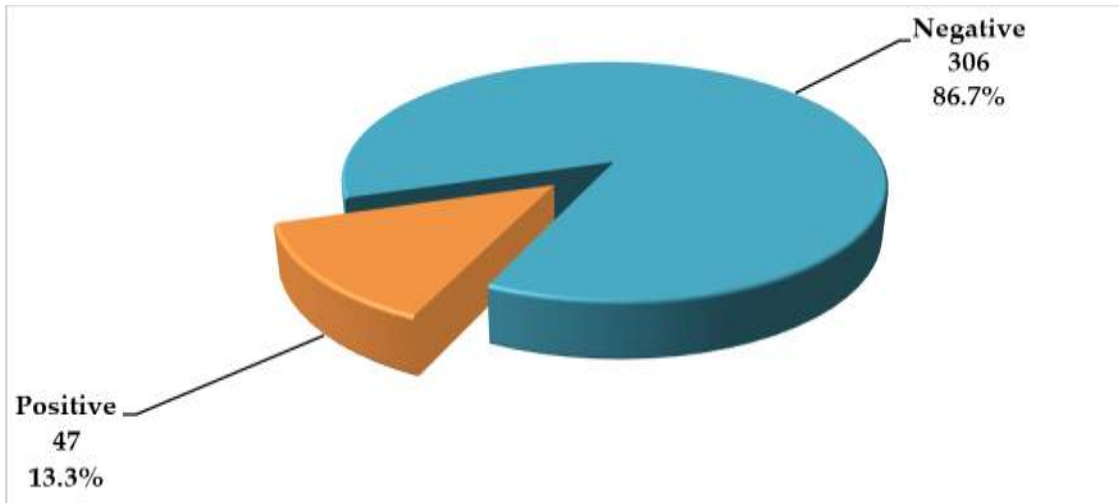


Figure (6):- The distribution of the study participants according to their history of anaemia (n = 353 pregnant women).

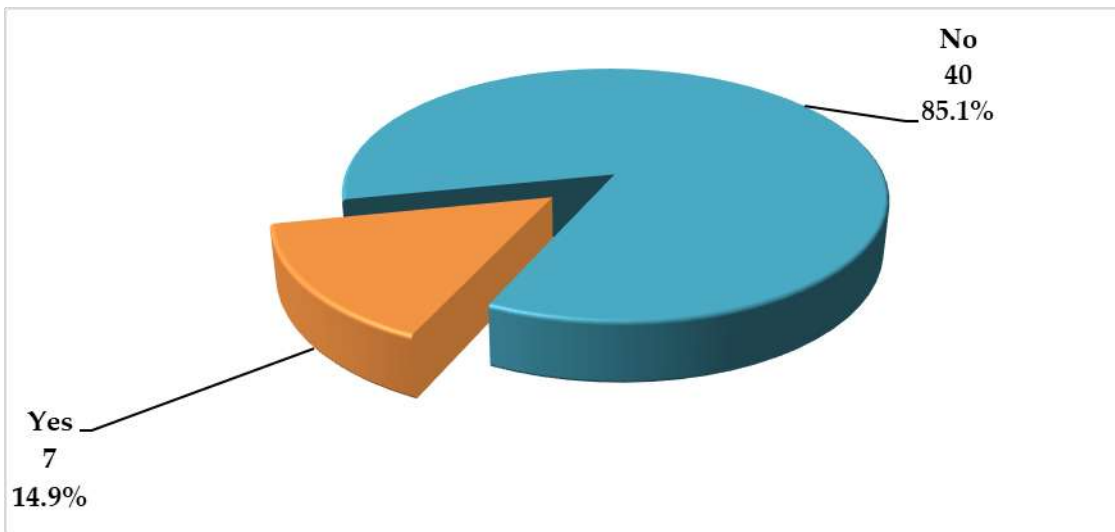


Figure (7):- The distribution Anemia in Pregnancy among women attending antenatal care Clinic in Wad Madani Teaching Hospital according to their past history of haemoglobinopathies (n = 47 pregnant women with past history of anaemia).

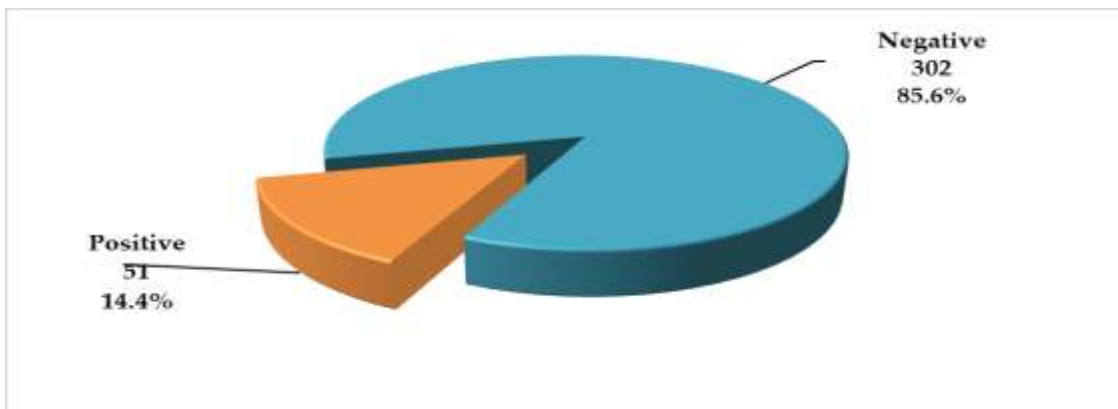


Figure (8):- The distribution Anemia in Pregnancy among women attending antenatal care Clinic in Wad Madani Teaching Hospital according to their family history of anaemia (n = 353 pregnant women).

Concerning the anaemia characteristics, the study showed that the prevalence of anaemia was 162 (45.9%), Figure (9) and 11 (6.8%) had severe anaemia, 42 (25.9%) moderate, and 109 (67.3%) mild anaemia as detailed in table (6)

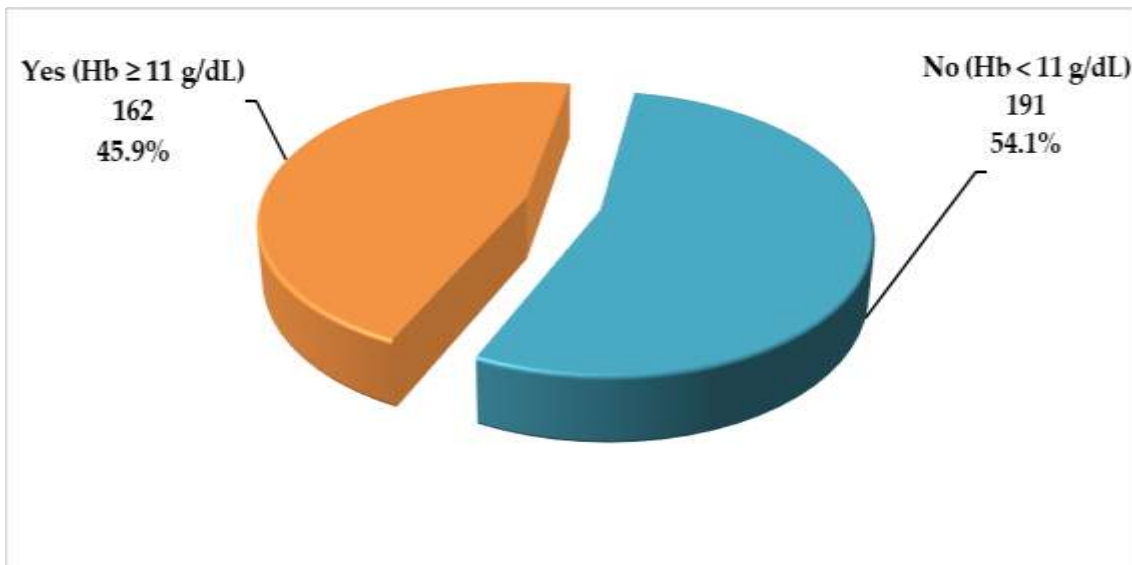
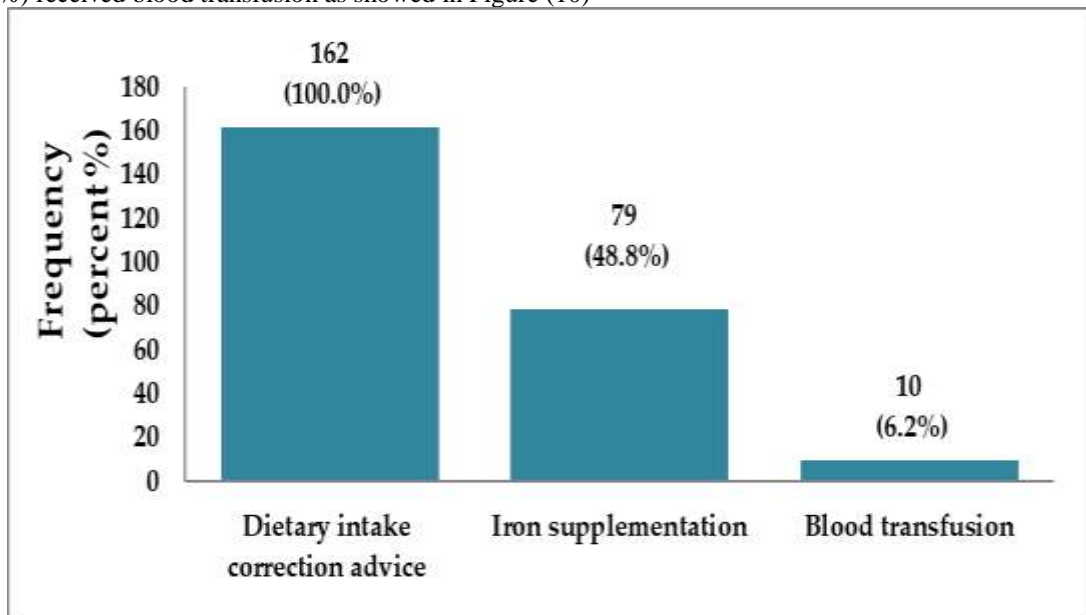


Figure (9):- The distribution Anemia in Pregnancy among women attending antenatal care Clinic in Wad Madani Teaching Hospital according to the prevalence of anaemia (n = 353 pregnant women)

| Anaemia severity | Frequency | Percent (%) |
|------------------------------|------------|--------------|
| Mild (9.00-10.99 g/dL) | 109 | 67.3 |
| Moderate (7.00-8.99 g/dL) | 42 | 25.9 |
| Severe anaemia (<7.00 g/dL). | 11 | 6.8 |
| Total | 162 | 100.0 |

Table (6):- According to the severity of anaemia (n = 162) The distribution Anemia in Pregnancy among women attending antenatal care Clinic in Wad Madani Teaching Hospital 162 anemic pregnant women).

All anemic patients received a dietary intake correction advice, 79 (48.8%) iron supplementation and only 10 (6.2%) received blood transfusion as showed in Figure (10)



In this study, cross tabulation was done to assess the possible association between the risk factors with the occurrence of anaemia among the pregnant women using chi square statistical test. The analysis found that the prevalence of anaemia was significantly higher among pregnant women with extreme ages (less 20 years and above 40 years), lower education, rural residence, higher parity, third trimester, irregular antenatal care visits, and with positive history of anaemia with p values < 0.05 as detailed in tables (7,8 and 9).

| Demographical factors | | Anaemia | | | | | | P value |
|-----------------------|---------------------|---------------|------|--------------|------|-----------------|------|---------|
| | | Yes (n = 162) | | No (n = 191) | | Total (n = 353) | | |
| | | Freq. | % | Freq. | % | Freq. | % | |
| Age - years | < 20 years | 71 | 43.8 | 8 | 4.2 | 79 | 22.4 | 0.001 |
| | 21 – 30 years | 52 | 32.1 | 131 | 68.6 | 183 | 51.8 | |
| | 31 – 40 years | 19 | 11.7 | 50 | 26.2 | 69 | 19.5 | |
| | > 40 years | 20 | 12.3 | 2 | 1.0 | 22 | 6.2 | |
| Education | Illiterate | 48 | 29.6 | 6 | 3.1 | 54 | 15.3 | 0.014 |
| | Primary | 72 | 44.4 | 7 | 3.7 | 79 | 22.4 | |
| | Secondary | 25 | 15.4 | 92 | 48.2 | 117 | 33.1 | |
| | University or above | 17 | 10.5 | 86 | 45.0 | 103 | 29.2 | |
| Residence | Rural | 69 | 42.6 | 45 | 23.6 | 69 | 42.6 | 0.002 |
| | Urban | 93 | 57.4 | 146 | 76.4 | 93 | 57.4 | |

Table (17):- The relation between demographical factors with the presence of anaemia (n = 353 pregnant women).

| Obstetrical factors | | Anaemia | | | | | | P value |
|-----------------------------|---------------------------|---------------|------|--------------|------|-----------------|------|---------|
| | | Yes (n = 162) | | No (n = 191) | | Total (n = 353) | | |
| | | Freq. | % | Freq. | % | Freq. | % | |
| Parity | Primigravidae | 37 | 22.8 | 62 | 32.5 | 99 | 28.0 | 0.001 |
| | Multigravida | 84 | 51.9 | 124 | 64.9 | 208 | 58.9 | |
| | Gran multigravida | 41 | 25.3 | 5 | 2.6 | 46 | 13.0 | |
| Gestational age – trimester | 1 st trimester | 39 | 24.1 | 73 | 38.2 | 112 | 31.7 | 0.034 |
| | 2 nd trimester | 42 | 25.9 | 93 | 48.7 | 135 | 38.2 | |
| | 3 rd trimester | 81 | 50.0 | 25 | 13.1 | 106 | 30.1 | |
| Regular antenatal care | Yes | 45 | 27.8 | 144 | 75.4 | 189 | 53.5 | 0.001 |
| | No | 117 | 72.2 | 47 | 24.6 | 164 | 46.5 | |

Table (8):- The relation between some obstetrical factors with the presence of anaemia (n = 353 pregnant women).

| Clinical factors | | Anaemia | | | | | | P value |
|---------------------------|-----------|---------------|------|--------------|------|-----------------|------|---------|
| | | Yes (n = 162) | | No (n = 191) | | Total (n = 353) | | |
| | | Freq. | % | Freq. | % | Freq. | % | |
| History of infection | Yes | 27 | 16.7 | 32 | 16.8 | 59 | 16.7 | 0.9825 |
| | No | 135 | 83.3 | 159 | 83.2 | 294 | 83.3 | |
| Past history of anemia | Positive | 39 | 24.1 | 8 | 4.2 | 47 | 13.3 | < 0.001 |
| | Negative | 123 | 75.9 | 183 | 95.8 | 306 | 86.7 | |
| family history of anemia | Positive | 23 | 14.2 | 28 | 14.7 | 51 | 14.4 | 0.9021 |
| | Negative | 139 | 85.8 | 163 | 85.3 | 302 | 85.6 | |
| Age of the youngest child | < 2 years | 102 | 63.0 | 120 | 62.8 | 222 | 62.9 | 0.979 |
| | ≥ 2 years | 60 | 37.0 | 71 | 37.2 | 131 | 37.1 | |

Table (19):- The relation between some clinical factors with the presence of anaemia (n = 353 pregnant women).

Discussion:-

Our study aimed to study the prevalence, risk factors and management of anemia with Pregnancy among women attending antenatal care clinic in Wad Madani Teaching Hospital (October 2021 to March 2022) and covered 353 participants (pregnant women).

Our study reported that more than half of them 183 (51.8%) were 21 – 30 years in age with mean age of 28 ± 8.2 years. In similar issue, in Sudan, Ishag Adam et al showed that age was not significantly associated with anaemia in pregnancy. [8]⁽⁷⁾. Furthermore, in Yugoslavia, Gabriela Bencaiova et al stated that in patients coming from developing countries, a significant increase of anemia for other reasons was observed and in patients older than 30 years (18). Also, lastly, in China, Li Lin et al reported that maternal anaemia was significantly associated with maternal age ≥ 35 years⁽¹⁹⁾. Our study did not show a significant association between the extreme age (< 20 years or > 40 years) of the pregnant woman with the prevalence of anemia. These findings can be explained to the fact that extreme ages, which are younger than 18 years or older than 40 years, were not adequately represented in this study. Therefore, it may be the conduction of a future study that focuses on the effect of age on the prevalence of anemia among pregnant women in Sudan is an important issue and highly recommended.

Our study reported that only 54 (15.3%) of them did not received any type of formal education. Similarly, in Tanzania, Stephen et al et al reported that low education level of the women was a factor that were independently associated with anaemia during pregnancy⁽¹⁵⁾. In similar issue, Sudan, by M A Abdelgadir et al stated that education was not associated with anaemia⁽¹⁶⁾. Furthermore, in Saudi Arabia, A A Mahfouz et al found that the anaemia prevalence was affected by age education (35.1% among illiterates).⁽¹⁷⁾ Moreover, in India, Manju Mehrotra et al reported that prevalence and severity of anemia decreased with increasing educational levels of both husband and wife.⁽¹⁸⁾ According to previous studies, the low level of formal education among pregnant women may be an indication of a low social or economic level. It may also be a direct reason for an increase in the prevalence of anemia due to a lack of proper awareness toward the factors causing anemia in pregnancy, and it may be due to health illiteracy that weakens the level of communication with the doctor or health staff and reduce the adherence to advice regarding the prevention and management.

Our study reported that less than third of the 114 (32.3%) were from rural residential areas. Similarly, Abel Gebre et al concluded that in pregnant women, rural residence was an independent predictor for increased anemia among the pregnant women⁽¹⁹⁾. Moreover, Romi Bansal et al stated that residence, was among the variables which had statistically significant association with the prevalence of anemia⁽²⁰⁾. Lastly, in China, Li Lin et al reported that maternal anaemia was significantly associated with rural residence⁽²¹⁾. As it is known, housing in rural areas may be related to various other factors such as low level of education, family income, an increase in the number of family members, poor health services and difficulty in accessing them. These factors, in turn, are directly or indirectly related to the prevalence of anemia among pregnant women in Sudan.

Moreover, our study reported that more than half of them 205 (58.1%) were housewives. In similar issue, Sudan, by M A Abdelgadir et al stated that occupation was not associated with anaemia⁽¹⁶⁾. While, in Ethiopia, Kidanemariam Berhe et al reported that farmer occupation was statistically significant for anemia among pregnant women⁽²²⁾. Anemia in pregnancy may be related to the environment of some professions/jobs and to the economic / social status of them. So, it is certain that the situation needs future studies that addressed the issue in the context of the occupation health related perspective for women of childbearing age in Sudan

Clinically, our study reported that 205 (58.9%) were multigravidas. Similarly, in Sudan, Ishag Adam et al reported that the prevalence of anaemia (73.2%) was significantly high in grand multigravida but on contrary, their analysis showed that parity was not significantly associated with anaemia.⁽⁷⁾ On contrary, in other study from Sudan, by M A Abdelgadir et al stated that parity was not associated with anaemia⁽¹⁶⁾.

Our study reported that nearly two thirds of them 222 (62.9%) reported that the age of their youngest children were less than two years. On contrary, in Sudan, by M A Abdelgadir et al reported that inter-pregnancy interval was not associated with anaemia⁽¹⁶⁾ Moreover, in Saudi Arabia, A A Mahfouz et al found that the anaemia prevalence was affected by inter-pregnancy spacing (35.2% among those whose birth spacing was less than 1 year).⁽¹⁷⁾

Our study reported that only third of them 112 (31.7%) were in the first trimester, while 106 (30.1%) in the third trimester. On contrary, in Sudan, by M A Abdelgadir et al reported that gestational age was not associated with anaemia.⁽¹⁶⁾ Furthermore, in Saudi Arabia, A A Mahfouz et al found that the anaemia prevalence was affected by gestational age.⁽¹⁷⁾ So, the results of our study regarding the distribution of anemia in different pregnancy trimesters (according to gestation age) is almost similar with the literature.

Our study reported that only 27 (7.6%) reported malaria infection within the current pregnancy, 11 (3.1%) worm infestation, and 18 (5.1%) schistosomiasis. Similarly, in Sudan, Ishag Adam et al reported that Malaria was risk factors for anaemia among pregnant women.⁽⁷⁾ Moreover, other study from Sudan, by M A Abdelgadir et al reported that only one patient had a positive blood film for malaria. Additionally, they stated that *S. mansoni* infections were significantly associated with anaemia⁽¹⁶⁾. Thus, preventive measures against malaria (chemoprophylaxis and insecticide-treated bed nets) may be needed for all pregnant women irrespective of their age or parity

Concerning the anaemia characteristics, our study showed that the prevalence of anaemia was 162 (45.9%), and 11 (6.8%) had severe anaemia, 42 (25.9%) moderate, and 109 (67.3%) mild anaemia. Anemia in pregnancy has been studied by several researchers worldwide, with diverse findings. Likewise, in Sudan, Ishag Adam et al reported that among pregnant women under their study, those, (62.6%) had anaemia (haemoglobin [Hb]: <11 gm/dl); 52.4% had mild anaemia (Hb: 9.0-10.9 gm/dl); 8.1% had moderate anaemia (Hb: 7.0-8.9 gm/dl); and 2.2% had severe anaemia (Hb: <7 gm/dl), respectively⁽⁷⁾. Moreover, other study from Sudan, by M A Abdelgadir et al reported that (40.8%) had anaemia (HB < 11 g/dl); (2.7%) had severe anaemia (HB < 7 g/dl) [27]. Furthermore, in Tanzania, Stephen et al et al reported that the prevalence of anaemia was 18.0% and 2% had severe anaemia [20]. Also, in Saudi Arabia, A A Mahfouz et al found that the overall prevalence of anemia (Hb < 11 g/dl) was found to be 31.9%.⁽¹⁷⁾ So, our results indicated that anaemia continues to be a severe health problem among pregnant women in Sudan.

Our study reported that all anaemic patients received a dietary intake correction advice, 79 (48.8%) iron supplementation and only 10 (6.2%) received blood transfusion. In similar context, many studies agreed that the governments should strengthen the antenatal care (ANC) services and every pregnant woman is given iron supplementation to combat anaemia, deworming, malaria prophylaxis, and mosquito nets [38 - 40]. Nowadays pregnant women must take malaria prophylaxis and deworms in front of the health care provider. This increases the uptake of medication and hence. The management strategy is dependent upon the period of gestation and severity of anemia. Widespread implementation of preventive and therapeutic strategies is still lacking in our country. Organization of awareness camps, patient group meetings and the use of social media can spread awareness of this public health issue.

The study had some limitations. In addition, the study only represented a limited group of pregnant women from one state (Gazira state) and its results may be difficult to be generalized to other states in Sudan with different health, social and economic conditions.

Conclusion:-

This study covered 353 participants (pregnant women). Concerning the anaemia characteristics, the study showed that the prevalence of anaemia was (45.9%), and only (6.8%) had severe anaemia. All anemic patients received a dietary intake correction advice, half of them iron supplementation and some received blood transfusion. The analysis found that the prevalence of anaemia was significantly higher among pregnant women with extreme ages (less 20 years and above 40 years), lower education, rural residence, higher parity, third trimester, irregular antenatal care visits, and with positive history of anaemia with p values < 0.05.

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