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CHANGES IN MCV IN PREGNANCY AND THALASSAEMIA AT MAYO HOSPITAL LAHORE

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Abstract:

Objective: *The aim of this research is to observe the positive and negative predictive value, specificity and sensitivity of the MCV (Mean Corpuscular Volume) in minor beta-thalassemia screening among expecting females presented at Mayo hospital Lahore.*

Methodology: *This research was carried out at Victoria Hospital Bahawalpur from January 2017 to December 2017. We interviewed pregnant females through a pre-designed questionnaire about the Gestational Age (GA) and Demographic Profiles. MCV was ≤ 70 fl as assessed on the first antenatal visit. Level of HbA2 was assessed through Hemoglobin (Hb) Electrophoresis in order to identify the minor beta-thalassemia carriers. Outcomes were analyzed on SPSS software.*

Results: *Minor Beta-thalassemia can best be assessed through MCV as among one hundred patients MCV was ≤ 70 fl in fifty-three percent of the females. Specificity and sensitivity were respectively 30% and 79% in the positive MCV assessment (under 70 fl) as observed in the beta-thalassemia screening. Both negative and positive predictive values were respectively reported as 56%.*

Conclusions: *It is reported in the research that specificity and sensitivity were respectively 30% and 79.9% in the positive MCV assessment (under 70 fl) as observed in the beta-thalassemia screening. Both negative and positive predictive values were respectively reported as 56%. Minor Beta-thalassemia can best be assessed through MCV as among one hundred patients MCV was ≤ 70 fl in fifty-three percent of the females. Thalassemia can be prevented through regular MCV screening. All young women can better be assessed through MCV in future in order to determine sub-fertility in the pregnant females.*

Keywords: *Mean Corpuscular Volume (MCV), Beta Thalassemia and Antenatal Screening.*

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INTRODUCTION:

Among various health issues among the Pakistani population, the incidence of thalassemia is also prominent [1]. The rates are very high as about forty thousand transfusion dependent cases of children diagnosed with thalassemia are enrolled each year and on an average five thousand are born affected in Pakistan [2]. Thalassemia is the most repeated monogenetic disorder and inherited haemoglobin (Hb) synthesis disorder with five percent frequency rate which is prevalent all over the globe [3, 4]. Minor Beta-thalassemia carriers are commonly asymptomatic; however, severe outcomes are reported among twenty-five percent of the children suffering from the same thalassemia type [5, 6]. It is also estimated that about one lac homozygous â thalassemia patients are present all over the world and the only cure is HSCT (Haemopoietic Stem Cell Transplantation) [7, 8]. HSCT is not accessible to the majority of the patients in Pakistan. Antenatal diagnosis and screening are a promising method to reduce the rates of morbidity and mortality among thalassemia patients in the prevalent countries with acceptable and feasible screening strategy especially among Muslim populated countries including Pakistan [9, 10].

An antenatal screening through CBC and MCV is cost-effective, useful and simple in order to detect minor beta-thalassemia carriers. This test is also a potent tool to prevent affected births of major thalassemia cases [10, 11]. Therefore, this research aimed to observe the positive predictive value, negative predictive value, specificity and sensitivity of the MCV (Mean Corpuscular Volume) in minor beta-thalassemia screening among expecting females.

METHODOLOGY:

Our validation research held at Victoria Hospital Bahawalpur from January 2017 to December 2017. We interviewed pregnant females through a pre-designed questionnaire about the Gestational Age (GA) and Demographic Profiles. MCV was ≤ 70 fl as assessed on the first antenatal visit. Level of HbA2 was assessed through Hemoglobin (Hb) Electrophoresis in order to identify the minor beta-thalassemia carriers. The research sample consisted on one hundred pregnant women with an MCV of ≤ 70 fl as reported in the Blood CP (Blood Complete Picture). Specimen collection was made in EDTA bottles which were further assessed in the pathology laboratory (1.7 mg) EDTA/ml. We did not include any pregnant female with any associated anaemia form or with a history of thalassemia. Required information about gestational age, consanguinity, occupation, education and age was collected on a pre-designed proforma. Outcomes were analyzed on SPSS software.

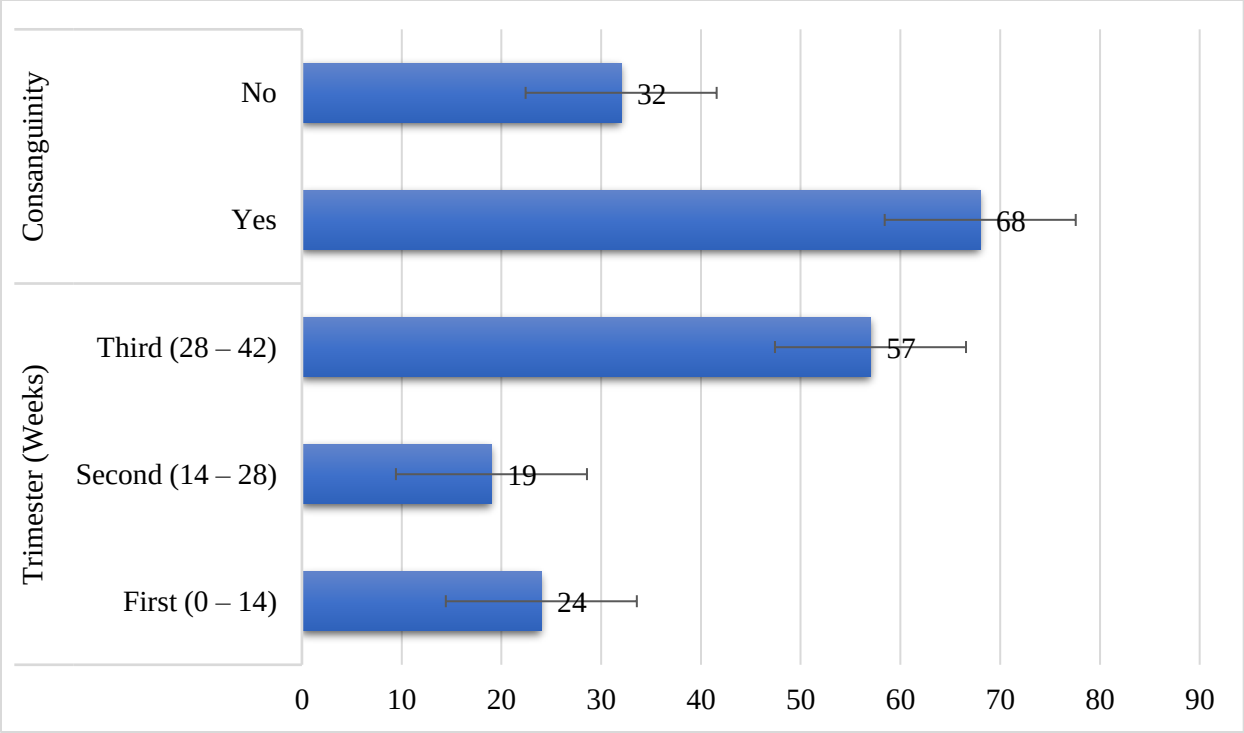
RESULT:

Minor Beta-thalassemia can best be assessed through MCV as among one hundred patients MCV was ≤ 70 fl in fifty-three percent of the females. Specificity and sensitivity were respectively 30% and 79% in the positive MCV assessment (under 70 fl) as observed in the beta-thalassemia screening. Both negative and positive predictive values were respectively reported as 56%.

Patients had a mean age factor of (27.7 ± 4.8) years; whereas, females belonged to an urban and rural population with respective proportions of 47% and 53%. The disease presentation was reported during first, second and third trimester having respective proportions of 24%, 19% and 57%. The majority of the females were presented in the third trimester (57%) as shown in the given tabular data. Consanguinity was present in 68 females; whereas, an absence was reported among 32 females.

Table – I: Trimester and Consanguinity Stratification

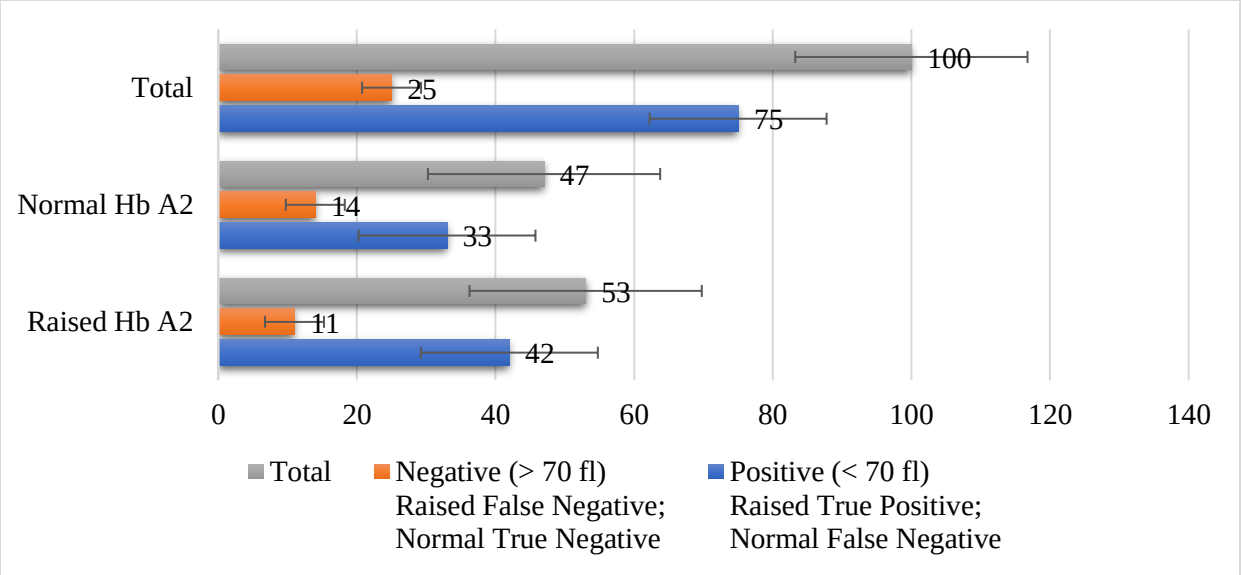
Trimester and Consanguinity		Number
Trimester (Weeks)	First (0 – 14)	24
	Second (14 – 28)	19
	Third (28 – 42)	57
Consanguinity	Yes	68
	No	32



The concentration of the haemoglobin among research participants was (9.34 ± 1.2) gm/dl; whereas the median was 9.4, the mode was 10 and range was reported as 6.7 gm/dl. The maximum and minimum level of haemoglobin was 13.3 and 6 gm/dl respectively. The value of MCV in mean ± SD was (65.2 ± 5.75) fl with a maximum and minimum MCV of 70 fl and 50 fl respectively. Positive MCV cases had respective raised and normal HbA2 as 42% and 33%. Whereas, in the negative cases of MCV raised and normal HbA2 was 11% and 14%. Normal and raised HbA2 values as reported in the Hemoglobin Electrophoresis assessment were respectively 47% and 53%. MCV is considered as a gold standard tool for thalassemia screening. Specificity and sensitivity were respectively 30% and 79%; whereas, both negative and positive predictive values were respectively reported as 56%.

Table – II: Raised and Normal Hemoglobin (Hb) Electrophoresis

MCV	Raised Hb A_2	Normal Hb A_2	Total
Positive (< 70 fl) Raised True Positive; Normal False Negative	42	33	75
Negative (> 70 fl) Raised False Negative; Normal True Negative	11	14	25
Total	**53**	**47**	**100**



DISCUSSION:

Thalassemia is referred to a haematological disorder which is mostly faced during the obstetrics practice all over the world with restricted availability of the national resources which cannot provide iron chelation therapy and blood transfusion to all the affected cases [7].

Poor people cannot afford the expensive treatment offered in the shape of BMT (Bone Marrow Transplantation) especially in countries like Pakistan [12]. The least expensive treatment is available in the regular screening strategy which is one of the available means of beta-thalassemia management. MCV is safe, effective and less costly; it also produces minimum false negative and positive outcomes among beta-thalassemia patients. Sirichotiyakul and Zaidi also support the reliability, cost-effectivity and simplicity of MCV [6, 10]. Disease progression is also attributed to the less educated and less knowledgeable female population. Urban and rural women were respectively 47% and 53%. According to Baig, thalassemia carrier is less found in rural populations [2]. Pakistan also faces an issue of cousin marriages which also leads to the incidence of thalassemia because of its cultural boundaries. Consanguinity posed a genetic risk as a result of cousin marriage which is also reported by Mehmoona Hafeez; the outcomes are similar to our research outcomes [1]. We reported a higher rate of the third trimester as poor families often start visiting the hospital at a later stage and in case of presence of pregnancy-induced disorders which are also reported in a research conducted in the Mediterranean background by Barbara Bain [11].

The concentration of the haemoglobin among research participants was (9.34 ± 1.2) gm/dl; whereas the median was 9.4, the mode was 10 and range was reported as 6.7 gm/dl. The maximum and minimum level of haemoglobin was 13.3 and 6 gm/dl respectively. The value of MCV in mean ± SD was (65.2 ± 5.75) fl with a maximum and minimum MCV of 70 fl and 50 fl respectively. Positive MCV cases had respective raised and normal HbA2 as 42% and 33%. Whereas, in the negative cases of MCV raised and normal HbA2 was 11% and 14%. Normal and raised HbA2 values as reported in the Hemoglobin Electrophoresis assessment were respectively 47% and 53%. Cronin EK reported more specificity and sensitivity in the cases with an MCV of 72 fl in order to diagnose thalassemia; Afroz also presented similar outcomes [13, 14]. The concentration of the Hemoglobin (Hb) is an instrument for thalassemia screening which is also found normal [3]. Our concentration of haemoglobin was comparable with the reported Hb concentration as forwarded by Suahib Ahmad [4]. Suhaib Ahmed reported the low concentration of Hb with mean and range of 10.4 g/dl and (7.9 – 12.4) g/dl respectively [4]. Normal and raised HbA2 values as reported in the Hemoglobin Electrophoresis assessment were respectively 47% and 53%. MCV is considered as a gold standard tool for thalassemia screening.

We reported that positive MCV cases had respective raised and normal HbA2 as 42% and 33%. Whereas, in the negative cases of MCV raised and normal HbA2 was 11% and 14%. Normal and raised HbA2 values as reported in the Hemoglobin Electrophoresis assessment were respectively 47% and 53%. Specificity and sensitivity were respectively 30% and

79%; whereas, both negative and positive predictive values were respectively reported as 56%. Contrary to our outcomes, Sirichotiyakal reported specificity and sensitivity as 83.9% and 92.9% respectively (MCV under 80 fl); whereas, the negative and positive predictive value was respectively 99% and 37% [6]. MCV is useful to screen larger female populations.

CONCLUSION:

It is reported in the research that specificity and sensitivity were respectively 30% and 79.9% in the positive MCV assessment (under 70 fl) as observed in the beta-thalassemia screening. Both negative and positive predictive values were respectively reported as 56%. Minor Beta-thalassemia can best be assessed through MCV as among one hundred patients MCV was $\leq$ 70 fl in fifty-three percent of the females. Thalassemia can be prevented through regular MCV screening. All young women can better be assessed through MCV in future in order to determine sub-fertility in the pregnant females.

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