Statistical Comparative Study Between Splenomegaly And Splenectomy In Thalassemia Patients

AmalHeshamHameed, Heba Saleh Shaheed

Al-Mustaqbal University College \ Department of Medical Laboratory Techniques .

INTRODUCTION

The spleen is a major lymphoid and blood filtration organ and is located in the left cranial abdomen .It is responsible for storing and removing erythrocyte form the blood as well as antigen surveillance of the blood and antibody production **(Katcher, 1980).**There are many factor effects on spleenand it's role and control it's function in the body and this can bethalassemia which is one of most a blood disorder passed down through families (inherited) in which the body makes an abnormal form or inadequate amount of hemoglobin (Hemoglobin is the protein in red blood cells that carries oxygen) **(Hameed, and Abbas, 2018).**The disorder results in large numbers of red blood cells being destroyed, which leads to anemia **(Casu, *etal.*, 2018).** There are many causes of thalassemia like inheriting abnormal and mutated genes involved in hemoglobin production from the parents, if one of the parent is a carrier for thalassemia, child may become a carrier of the disease, though child will not have any symptoms.**(Prathyusha, *et al* ., 2019).** As well there is some changes can occur like splenomegaly which grouped on the basis of the pathogenic mechanismwhich can be acute due to increase in function of spleen in some of condition or due massive splenomegaly due to parasitic infection incluedvisceral leishmaniasis (**Shaheed and Faleh, 2018).** Splenectomy causes an increased risk of sepsis due to encapsulated organisms (such as S. pneumoniae and Haemophilusinfluenzae).It has been found that the risk of acquiring sepsis is 10 to 20 times higher in a splenectomized patient compared to a non-splenectomized patient, which can result in death, especially in young children but in some condition the splenectomy is usually considered a life-saving procedure in traumatized individuals, certain hematological disorders, malignant conditions, and for the sake of diagnostic purposes (**Tahir , *et al.*, 2020).**

Key words : Thalassemia, splenomegaly , Splenectomy.

Material and methods

The samples were collected exclusively from males aged 9 to 15 years and the number of specimens that have been worked is 44 sampleof which were eradication of spleen and 24 samples of spleen enlargement (**A : Splenomegaly B : Splenectomy) .**The cbc has been used to obtain the required results.

Methods: This device is used to give a complete picture of the blood components. EDTA blood tubes are used as the best anticoagulant for the Department of Hematology, which prevents the accumulation of blood cells and other components on each other, which helps to give correct results and ensure the safety of the CBC device from the obstruction of the ducts in the device The passage of clotted clusters of blood components.The platelets coulter process of the C.B.C process counts the white blood cells, red blood cells and blood components.The scientific idea in the method of counting the blood components is to contain the device in the first two chambers measured by the white blood cells and hemoglobin is measured by the analysis of red blood cells by a material to break the red blood cells and the exit of hemoglobin, which is measured by the optical measuring device spectrophotometers.The second chamber is measured in red blood cells and platelets (**Shirish, and Kawthalkar, 2013).**

Measurement :The measurement method depends on the presence of an electric field saturated with the solution of Isoton to offset the charges, and the presence of a column passes by a constant voltage current, when the passage of one of the components of blood, it generates partial resistance to the current passing through the electric bar and measuring the strength of resistance generated by the passage of these components.Depending on the size of the blood components passing by and the intensity of the electrical resistance, the difference between these components is as follows: 1-Platelets Platelets of 20-40 µm. , 2-Red blood cell from 40-60 microns and White blood

cell> 60 microns.The following tests are measured and calculated mathematically by equations stored in the machine:A CBC usually includes white blood cell count (WBC), red blood cell count (RBC), hemoglobin, hematocrit, red cell indices (MCV, MCH, MCHC), and platelet count. Some others tests listed under the CBC include red cell distribution width (RDW), mean platelet volume (MPV) and a differential examination of the quality and quantity of various white cells reported either in percent or absolute terms**(James, 2009).**

Figure(3.1) explane CBC Full Blood Analysis hematology Genex count

Results

Table 1 : showed the differences of WBCs in Splenomegaly and Splenectomy:

	mean	St.d	maxima	minima
Splenomegaly	7.33	3.36	16.20	1.80
Splenectomy	15.26	8.58	41.70	4.40

	Low (<4)	moderate(4- 11)	High (>11)	sum
Splenomegaly	3	17	3	23
Splenectomy	0	7	15	22
sum	3	24	18	**45**

Table 2 : showed the Chi- Sq. for WBC :

Table 3 : showed the result of Chi- Sq. for each cell WBC:

t	t1	(t-t1)^2	(t-t1)^2/t1
3	1.53	2.15	1.40
17	12.27	22.40	1.83
3	9.20	38.44	4.18
0	1.47	2.15	1.47
7	11.73	22.40	1.91
15	8.80	38.44	4.37
			15.15

Table 4 : showed the differences ofLYM in Splenomegaly and Splenectomy

	mean	St.d	maxima	minima
Splenomegaly	**2.78**	1.43	6.12	0.61
Splenectomy	6.06	2.60	13.90	2.38

Table 5 : showed the Chi- Sq. for LYM:

	Low (< 1.09)	Moderate (1.09- 2.99)	High (> 2.99)	sum
Splenomegaly	**1**	**13**	**9**	**23**
Splenectomy	**0**	**12**	**20**	**22**
sum	**1**	**25**	**29**	**45**

Table 6 : showed the result of Chi- Sqr for each cell LYM:

t	t1	(t-t1)^2	(t-t1)^2/t1
1	**0.51**	**0.24**	**0.468**
13	**12.78**	**0.05**	**0.004**
9	**14.82**	**33.90**	**2.287**
0	**0.49**	**0.24**	**0.489**
12	**12.22**	**0.05**	**0.004**
20	**14.18**	**33.90**	**2.391**
			5.64

Table 7 : showed the differences of RBCin Splenomegaly and Splenectomy:

	mean	St.d	maxima	minima
Splenomegaly	**3.32**	**0.98**	**5.78**	**1.96**
Splenectomy	**2.98**	**0.86**	**5.21**	**1.98**

Table 8 : showed the Chi- Sq. for RBC:

	Low (< 4.0)	moderate (4.0- 5.0)	High (> 5.0)	sum
Splenomegaly	17	4	2	23
Splenectomy	19	2	1	22
sum	36	6	3	45

Table 9 : Showed the result of Chi- Sq. for each cell RBC :

t	t1	(t-t1)^2	(t-t1)^2/t1
17	18.40	1.96	0.107
4	3.07	0.87	0.284
2	1.53	0.22	0.142
19	17.60	1.96	0.111
2	2.93	0.87	0.297
1	1.47	0.22	0.148
			1.09

Table 10 : : showed the differences of HGB in Splenomegaly and Splenectomy:

	mean	St.d	maxima	minima
Splenomegaly	7.02	2.05	13.2	5.18
Splenectomy	7.33	1.46	10.40	4.98

Table 11 : showed he Chi- Sq. for HGB:

	Low (< 11.0)	moderate (11.0- 16.0)	High (> 16.0)	sum
Splenomegaly	22	1	0	23
Splenectomy	22	0	0	22
sum	44	1	0	45

Table 12 : : showed the differences of PT in Splenomegaly and Splenectomy:

	mean	St.d	maxima	minima
Splenomegaly	215.53	81.18	395.00	42.10
Splenectomy	512.75	306.13	1116.00	81.50

Table 13 : showed the Chi- Sqr for PT :

	Low (< 150)	moderate (150- 400)	High (> 400)	sum
Splenomegaly	3	20	0	23
Splenectomy	1	9	12	22
sum	4	29	12	45

Table 14 :showed the result of Chi- Sq. for each cell PT :

t	t1	(t-t1)^2	(t-t1)^2/t1
3	2.04	0.91	0.447
20	14.82	26.81	1.809
0	6.13	37.62	6.133
1	1.96	0.91	0.467
9	14.18	26.81	1.891
12	5.87	37.62	6.412
			17.16

Splenomegaly	7.02	3.32	2.78	7.33
Splenectomy	7.33	2.98	6.06	15.26
Range	13.50	4.50	1.50	7.50

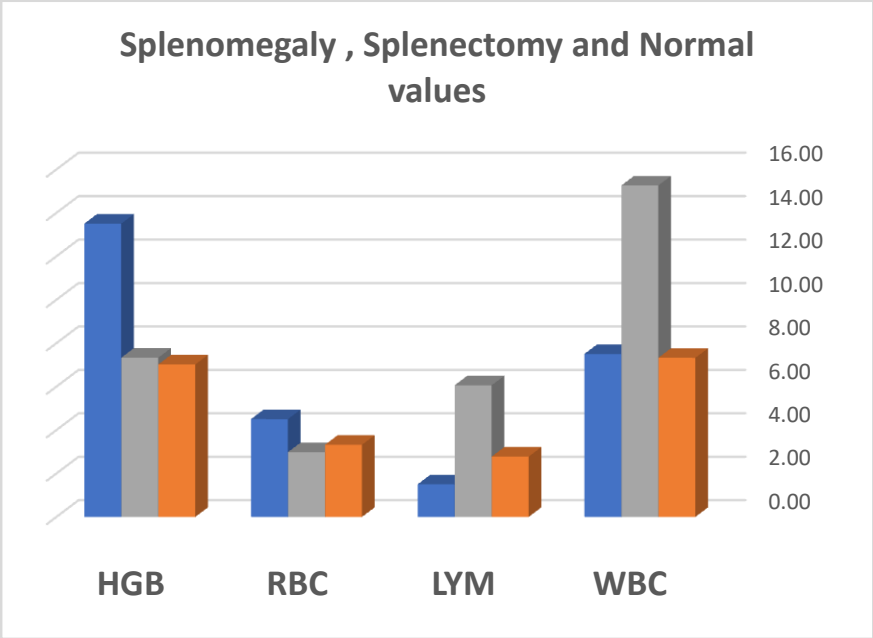

Figure (1) shows the means of WBC , LYM , RBC and HGB for the two cases Splenomegaly and Splenectomy in comparison with the natural means.

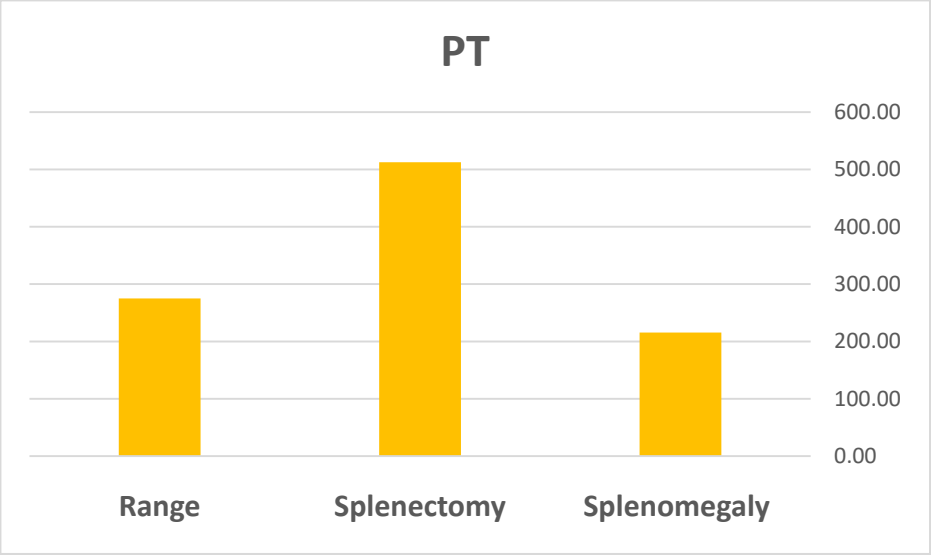

Figure (2) shows the means of PT for the two cases Splenomegaly and Splenectomy in comparison with the normal mean**.**

Dissection

In thus study we found that the mean of WBC in the case of Splenomegaly (7.33) is within the natural range (7-11) , but that of Splenectomy (15.26) is much above the upper limit (11) . For finding a statistical significance to this difference in the two cases a chi-square test is made as showed in the table(1) and table (2) **(Luu*etal.*, 2019).** While the final sum of Chi – Sq. which is (15.15) and for a degree of freedom equals (2) . there is a statistical significance for a confidence of 0.1% . as showed in table (3) **Vikse,*et al.*, 2017).** The mean of LYM in the case of Splenomegaly (2.78) is within the natural range (1.09-2.99) , but that of Splenectomy (6.06) is much above the upper limit (2.99) . For finding a statistical significance to this difference in the two cases a chi-square test is made as showed in the table (4) while the final sum of Chi – Sq.showed a value of (5.64) and for a degree of freedom equals (2) . there is a statistical significance for a confidence of 5% approximately as showed in table (5) (**Lewis *et al.*, 2019).**The mean of LYM in the two cases of Splenomegaly and Splenectomy (3.32) and (2.98) is under the lower natural range (4-5) . However a chi-square test is made for more investigation, while the final sum of Chi – Sq. which is (1.09) and for a degree of freedom equals (2) . there is no statistical significance as showed in table (6).The mean of HGB in the two cases of Splenomegaly and Splenectomy (7.02) and (7.33) is much under the lower natural range (11-16) as showed in table (7 and 8) . However a chi-square test is made for more investigation as showed in table in table (9,10 and 11) (**Hameed, and Abbas, 2018).**The mean of PT in the case of Splenomegaly (215.53) is within the natural range (150-400) , but that of Splenectomy (512.75) is much above the upper limit (400) . For finding a statistical significance to this difference in the two cases a chi-square test is made as showed in table (12) . as well as the final sum of Chi – Sq. which is (17.16) and for a degree of freedom equals (2) . there is a statistical significance for a confidence of 0.1% approximately as showed in table (13 and 14) **(Casu*et al.*, 2020).**

References:

1. ***Casu, C. ; Presti, V. ; Oikonomidou, ; P and Melchiori, L. (2018).****Short-term administration of JAK2 inhibitors reduces splenomegaly in mouse models of β-thalassemia intermedia and major. Haematologica.; 103(2): 46–49.*
2. ***Prathyusha, K. ; Venkataswamy, M. ; Sridivya , K. and Saikrupa, K. (2019).*** *Thalassemia -A Blood Disorder, its Cause, Prevention and Management. Research Journal of Pharmaceutical Dosage Forms and Technology 11(3):975-4377.*
3. ***Katcher, A.L .(1980).*** *"Familial asplenia, other malformations, and sudden death". Pediatrics. 65 (3): 633–5.*
4. ***Hameed, A.H. and Abbas, N.H . (2018).****High and Low Hemoglobin Levels During Pregnancy.Department of Pathological analysis techniques, Al-Mustaqbal University College, Iraq. Journal of Bioscience and Applied Research,4 (3):260-266.*
5. ***Shaheed, H.S. and Faleh, E.B. (2018).*** *Effect of pyocin from Pseudomonas aeruginosa on liver and spleen pathology induced by Leishmania donovani in BALB/C mice College of Veterinary Medicine, University of Baghdad, Iraq. Online Journal of Veterinary Research. 22 (9):754-760.*
6. ***Tahir F, Ahmed J, Malik F. (2020)****. Post-splenectomy Sepsis: A Review of the Literature. 12(2): 6898.*
7. ***Steiniger, B. S. ; Wilhelmi, V. ; Berthold, M. ; Guthe, M. and Lobachev, O. (2020).*** *Locating human splenic capillary sheaths in virtual reality, (8) :15720.*
8. ***Luu, S. ; Spelman, D. and Woolley, I.J. (2019).*** *Post-splenectomy sepsis: preventative strategies, challenges, and solutions.Infect Drug Resist. ; 12: 2839–2851.*
9. ***Vikse, J. ; Sanna, B. and Henry, B.M. (2017).*** *The prevalence and morphometry of an accessory spleen: A meta-analysis and systematic review of 22,487 patients. Int. J. Surg.;45:18–28.*
10. ***Lewis, S.M. ; Williams, A. and Eisenbarth, S.C. (2019).*** *Structure and function of the immune system in the spleen. Sci.Immunol., (4):33.*
11. ***Shirish, M. and Kawthalkar, (2013).*** *Essentials ofHaematology, India,second edition (75).*
12. ***James, A.K.*** *(2009). Diagnostic Hematology.University of PretoriaHillcrest, PretoriaSouth Africa. Springer., 1-488.*