CODEN [USA]: IAJPBB ISSN: 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES
http://doi.org/10.5281/zenodo.3836387

Available online at: http://www.iajps.com Research Article

CORRELATION BETWEEN NEPHROPATHY AND OPHTHALMIC COMPLICATIONS IN CASES OF SICKLE CELL ANEMIA: AN ENTANGLED ASSOCIATION

[1]Dr.Farzeen Safdar, [2]Dr.Irum Tariq, [3]Dr.Muhammad Kaleem Abbas Gurmani
[1]Quaid-e-Azam Medical College Bahawalpur, University of Health Sciences Lahore.

Article Received: March 2020 **Accepted:** April 2020 **Published:** May 2020

Abstract:

Background- *Due to pre-mature RBC destruction and unpredictable vasocclusion episodes sickle cell disease happens which give rise to tissue ischemia and acute pain. Dysfunction of endothelial occurs in kidneys due to nephron leading to infarction, ischemia, vaso-occlusion, microalbuminuria which ultimately causes the loss of nephron. Due to this retinal change non-proliferative and proliferative occurs.*

Objective- *To find the relation between the Ophthalmic complications and Nephropathy in cases of sickle cell anemia.*

Methods- *For this study 35 adults were selected from outpatient department of Bahawalpur Victoria Hospital , whose age were between 18 to 60 years and they all were suffering in disease of sickle cell. Blood samples were collected, and complete blood analysis were done as well as assessment of urine albumin: ophthalmic findings and creatinine ratio, studied by slit-lamp biomicroscopy indirect and direct ophthalmoscopy.*

Result- *Two groups were made on the bases of two categories in which first one consist of seven patients who were admitted to Victoria Hospital Bahawalpur and the other category consist of twenty eight patients who were clinically stable. Peripheral retinopathy was found in 7.1% patients i.e. 2 of category 2 and 71.4% patients of first category. The patients of category 1 and category 2 had mean of 6.17 ± 2.14 and 2.89 ± 1.81blood transfusions respectively. Mean Hb in patients of category 2 was 7.95 ± 0.81 gm whereas in patients of category 1 it was 6.37 ± 0.35 gm/dl. The patients of Ophthalmic manifestations had the mean creatinine ratio/ urine albumin 286.71 ± 74.75 mg/g while it was 31.82 ± 4.48 mg/g in patients who had no Ophthalmic manifestations, this difference was very significant.*

Conclusion- *It was concluded in this study that the manifestation of sickle vasculopathy mechanism is correlated with sickle cell retinopathy and nephropathy and these are regarded as the indicators of each other.*

Keywords: *Urine albumin/creatinine ratio, sickle retinopathy, sickle nephropathy, sickle cell disease*

Corresponding author:
Dr. Farzeen Safdar,
Quaid-e-Azam Medical College Bahawalpur,
University of Health Sciences Lahore.

QR code

Please cite this article in press Farzeen Safdar et al, ***Correlation Between Nephropathy And Ophthalmic Complications In Cases Of Sickle Cell Anemia: An Entangled Association.,*** *Indo Am. J. P. Sci, 2020; 07(05).*

INTRODUCTION:

Due to mutation in gene of beta-globin sickle cell disease occur which causes the change in amino acid to valine forming HbS from glutamic acid which provoke the dysfunction of premature Red blood cells and unpredictable vaso-occlusion episodes. Due to pre-mature RBC destruction and unpredictable vasocclusion episodes sickle cell disease happens which give rise to tissue ischemia and acute pain. Dysfunction of endothelial occurs in kidneys due to nephron leading to infarction, ischemia, vaso-occlusion, microalbuminuria which ultimately causes the loss of nephron. Due to this retinal change non-proliferative and proliferative occurs. Disease like renal begins which could be a reason of chronic diseases of kidney. Previous researches shown that abnormality in albuminuria, HbSS/HbS(0) is correlated with the baseline hemoglobin. In patients with sickle cell disease the detection of damage due to earl glomerular is related with the albuminuria as a biomarker.

Due to the elevation of serum creatinine disease may reach to chronic renal failure stage. There should be initiative taken for the therapy of renal impairment at early stages when the sicle cell nephropathy is recognized. In patients with Hb sickle cell genotype proliferative sickle retinopathy is more common. Therefore, the aim of this study is to find the relation between the Ophthalmic complications and Nephropathy in cases of sickle cell anemia.

METHODOLOGY:

For this study 35 adults were selected whose age were between 18 to 60 years and they all were suffering in disease of sickle cell. All those patients were excluded:

- Patients who had any blood dyscrasias like thalassemia
- Patients who were on the medication of anti-inflammatory such as Cox-inhibitor or glucocorticoid therapy
- Patients who were suffering in any chronic infection like hypertension, diabetes mellitus, vascular disease

A written consent was signed by all the patients which included complete detail about the aim, methodology, and implication of this study. Blood samples were collected, and complete blood analysis were done as well as assessment of urine albumin: ophthalmic findings and creatinine ratio, studied by slit-lamp biomicroscopy indirect and direct ophthalmoscopy.

Calculation of creatinine and urine albumin:

Albumin to creatinine ratio was measured by the samples of urine and its normal ratio was measured less than 30. The classification of obtained values was as followed:

30–300 being microalbuminuria and greater than 300 being macroalbuminuria

Urine albumin in mg/dl/urine creatinine in g/dl = Urine ACR (UACR) in mg/g

Ophthalmic procedures carried out:

A detailed eye examination was performed including slit-lamp biomicroscopy indirect and direct ophthalmoscopy. Patients having Sickle cell disease with glaucoma, posterior/ anterior segment pathology, mature senile cataracts were excluded from the examination of ophthalmic.

The disc and media characteristics such as foveal reflex, peripheral macula, blood vessels, margins, shape, size, cup and color was then evaluated.

Statistical analysis:

For statistical analysis, obtained data was entered in MS Excel and this analysis was done by using the inferential statistics, including Student's t-test and Chi-square test. SPSS 22.0 version was used for this.

RESULTS:

Two groups were made on the bases of two categories in which first one consists of seven patients who were admitted to Victoria hospital Bahawalpur and the other category consist of twenty-eight patients who were clinically stable. Peripheral retinopathy was found in 7.1% patients i.e. 2 of category 2 and 71.4% patients of first category. The patients of category 1 and category 2 had mean of 6.17 ± 2.14 and 2.89 ± 1.81blood transfusions respectively. Mean Hb in patients of category 2 was 7.95 ± 0.81 gm whereas in patients of category 1 it was 6.37 ± 0.35 gm/dl. The patients of Ophthalmic manifestations had the mean creatinine ratio/ urine albumin 286.71 ± 74.75 mg/g while it was 31.82 ± 4.48 mg/g in patients who had no Ophthalmic manifestations, this difference was very significant.

Table 1: Comparison of chief complaints among Category I and Category II patients

Chief complaints	Category of patients (%)		Total (/35) (%)	$\chi 2$, *P*
	Category I (/7)	Category II (/28)		
Fatigue and malaise	6 (85.7)	12 (42.8)	18 (51.4)	21.10, 0.036 (S)
Back pain	5 (71.4)	6 (21.4)	11 (31.4)	
Recurrent URTI	3 (42.8)	7 (25.0)	10 (28.5)	
Bone pain	2 (28.5)	3 (10.7)	5 (14.2)	
Chest pain	2 (28.5)	0	2 (5.71)	

Table 2: Parameters observed on fundoscopic examination

Parameters observed on fundoscopic examination	Number of patients with positive findings (%)			*t, P*
	Category I (/7)	Category II (/28)	Total (/35)	
Venous tortuosity	5 (71.4)	2 (7.1)	7 (20)	4.01, 0.0001 (S)
Salmon-patch hemorrhages	2 (28.5)	0	2 (5.7)	
Silver wiring of arterioles	4 (57.1)	1 (3.5)	5 (14.2)	
Sea-fan neovascularization	1 (14.2)	0	1 (2.8)	
Vitreous hemorrhages	0	0	0	
Rhegmatogenous retinal detachment	0	0	0	

In patients of category 2 the symptoms of peripheral retinopathy were found. In Goldberg's staging of PSR and sickle cell anemia parameters were compared including common vascular changes. In patients of category 1 the results of fundoscopic observation were found very significant as compared to the patients of category 2 as shown in table 2.

DISCUSSION:

During this cross-sectional study there was no relation found between ophthalmic findings versus age and gender. In patients of sickle cell anemia and greater morbidity a positive correlation was found. In sickle cell patient during adolescence renal damage is found to be a progressive damage which can be a cause of renal failure if it is not treated in early stages and increase mortality up to 12% in adult of sickle cell gene. Another early manifestation of renal parenchymal damage is microalbuminuria which can occur in 30 to 60% of sickle cell diseases patients.

Peripheral retinopathy was found in 7.1% patients i.e. 2 of category 2 and 71.4% patients of first category. The patients of category 1 and category 2 had mean of 6.17 ± 2.14 and 2.89 ± 1.81blood transfusions respectively. Mean Hb in patients of category 2 was 7.95 ± 0.81 gm whereas in patients of category 1 it was 6.37 ± 0.35 gm/dl. The patients of Ophthalmic manifestations had the mean creatinine ratio/ urine albumin 286.71 ± 74.75 mg/g while it was 31.82 ± 4.48 mg/g in patients who had no Ophthalmic manifestations, this difference was very significant.

Due to the elevation of serum creatinine disease may reach to chronic renal failure stage. There should be initiative taken for the therapy of renal impairment at early stages when the sicle cell nephropathy is recognized. In patients with Hb sickle cell genotype proliferative sickle retinopathy is more common. Therefore, the aim of this study is to find the relation between the Ophthalmic complications and Nephropathy in cases of sickle cell anemia. Despite the fact that there are no particular clinical signs that can foresee the advancement of SCD to include the retinal vascular framework, a couple of creators have discovered that patients giving emergency and splenic sequestration ought to be considered for early ophthalmic assessment. Besides, patients with G6PD insufficiency ought to be taken for early screening, as it has been reported to be a significant inclining factor in quickening movement to retinopathy. Still, most patients hold satisfactory vision since the retinopathy happens in the outskirts, and any related "sea-fan" neovascularization has a high propensity for autoinfarction, relapsing unexpectedly. Accordingly, vision misfortune from sickle retinopathy is generally preventable through regular fundoscopic assessments and treatment as indicated. Wide-field fluorescein angiography and shading imaging can help recognizable proof of fringe vascular renovating and appraisal of high-risk attributes for proliferative retinopathy. Treatment of sickle cell retinopathy today is being completed utilizing modalities, for example, photocoagulation and cryotherapy to treat neovascularization.

CONCLUSION:

By early detection of major complications of SCD that is retinopathy and nephropathy can be controlled. It was concluded in this study that the manifestation of sickle vasculopathy mechanism is correlated with sickle cell retinopathy and nephropathy and these are regarded as the indicators of each other. The good predictor of these diseases is UACR which can proceed to retinopathy. If a patient has a previous history of raised UACR, long lasting clinical features, lower Hb level and blood transfusions then such patients should be guided to fundoscopic examination so that peripheral retinopathy can be prevented.

REFERENCES:

1. Jameson J, Kasper D, Fauci A, Hauser S, Longo D, Loscalzo J, et al. Harrison's Principles of Internal Medicine. 19th ed. New York, NY: McGraw-Hill Education; 2015. p. 635-6.
2. Guasch A, Cua M, Mitch WE. Early detection and the course of glomerular injury in patients with sickle cell anemia. Kidney Int 1996;49:786-91.
3. Jain D, Arjunan A, Sarathi V, Jain H, Bhandarwar A, Vuga M, et al. Clinical events in a large prospective cohort of children with sickle cell disease in Nagpur, India: Evidence against a milder clinical phenotype in India. Pediatr Blood Cancer 2016;63:1814-21.
4. Celik T, Unal S, Ekinci O, Ozer C, Ilhan G, Oktay G, et al. Mean platelet volume can predict cerebrovascular events in patients with sickle cell anemia. Pak J Med Sci 2015;31:203-8.
5. Jain D, Warthe V, Dayama P, Sarate D, Colah R, Mehta P, et al. Sickle cell disease in central India: A potentially severe syndrome. Indian J Pediatr 2016;83:1071-6.
6. Audard V, Bartolucci P, Stehlé T. Sickle cell disease and albuminuria: Recent advances in our understanding of sickle cell nephropathy. Clin Kidney J 2017;10:475-8.
7. Lichtman M. Williams Manual of Hematology. 9th ed. New York, NY: McGraw-Hill Education/Medical; 2015. p. 581-605.
8. Do BK, Rodger DC. Sickle cell disease and the eye. Curr Opin Ophthalmol 2017;28:623-8.
9. Menaa F, Khan BA, Uzair B, Menaa A. Sickle cell retinopathy: Improving care with a multidisciplinary approach. J Multidiscip Healthc 2017;10:335-46.
10. Feroze KB, Azevedo AM. Retinopathy, Hemoglobinopathies. Treasure Island (FL): StatPearls Publishing; 2017.
11. Gustave BW, Oliver SC, Mathias M, Velez-Montoya R, Quiroz-Mercado H, Olson JL, et al. Reversal of paracentral occlusive retinopathy in a case of sickle cell disease using exchange transfusion. Ophthalmic Surg Lasers Imaging Retina 2013;44:505-7.
12. Tehseen S, Joiner CH, Lane PA, Yee ME. Changes in urine albumin to creatinine ratio with the initiation of hydroxyurea therapy among children and adolescents with sickle cell disease. Pediatr Blood Cancer 2017;64. doi: 10.1002/pbc.26665.

13. Alhwiesh A. An update on sickle cell nephropathy. Saudi J Kidney Dis Transpl 2014;25:249-65.
14. Leveziel N, Lalloum F, Bastuji-Garin S, Binaghi M, Bachir D, Galacteros F, et al. Sickle-cell retinopathy: Retrospective study of 730 patients followed in a referral center. J Fr Ophtalmol 2012;35:343-7.
15. Rosenberg JB, Hutcheson KA. Pediatric sickle cell retinopathy: Correlation with clinical factors. J AAPOS 2011;15:49-53.
16. Scott AW. Ophthalmic manifestations of sickle cell disease. South Med J 2016;109:542-8.
17. Cho M, Kiss S. Detection and monitoring of sickle cell retinopathy using ultra wide-field color photography and fluorescein angiography. Retina 2011;31:738-47.
18. Cohen SB, Fletcher ME, Goldberg MF, Jednock NJ. Diagnosis and management of ocular complications of sickle hemoglobinopathies: Part V. Ophthalmic Surg 1986;17:369-74.