STUDY OF THE EFFECT OF HEMODIALYSIS ON INTRAOCULAR PRESSURE AND OCULAR PERFUSION PRESSURE

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Introduction

During HD, numerous metabolic parameters can change, including blood urea, sodium, potassium, and glucose levels, these fluctuations result in osmotic changes in blood, aqueous and vitreous humor, and other extracellular fluids, many conflicting IOP results have been published some of them suggest that the decrease in plasma osmolarity may lead to an increase in IOP as contemporary hemodialysis is highly efficient in the removal of urea and other small molecules from the blood. Indeed, the removal of urea has been studied extensively for decades as a method to assess the efficiency or adequacy of dialysis treatments. OPP represents the pressure of blood flowing in ocular blood vessels and is defined as the difference between mean arterial pressure and IOP, which is an important factor in regulating blood flow within the eye. Adequate oxygenation of ocular tissues depends on maintenance of ocular perfusion pressure (OPP) through systemic regulation of blood pressure (BP) and local regulation of IOP. It has been proposed that vascular dysregulation leads to abnormal ocular perfusion and thus optic nerve ischemia, serving as an underlying cause of glaucomatous damage. Ocular perfusion pressure autoregulation which is the ability of a vascular bed to change vascular resistance in response to perfusion pressure changes to maintain a relatively constant blood flow, plays a crucial role in maintaining blood flow to the optic nerve, as intradialytic hypotension is a common complication of HD, also vascular calcification and vasomotor dysfunction are present in most HD patients, as a result of systemic diseases and side effects of HD, thereby weakening the adjustment ability of the vascular bed.

Aim of the work

The aim of this study was to assess the effect of hemodialysis on intraocular pressure and ocular perfusion pressure.

Patients and Methods

This is a prospective observational study that was conducted in the dialysis unit of ElMowasah University Hospital, End stage renal disease both male and female patients undergoing regular hemodialysis for more than 6 months and more than 18 years old were included in the study. Each patient provided their informed consent, and the trial was carried out in accordance with the Helsinki declaration. The ethical committee of the Alexandria Faculty of Medicine approved the study before it could be carried out. All patients in this study underwent ophthalmic examination before starting the session in ophthalmology clinic And blood pressure was measured simultaneously using mercury sphygmomanometer and ocular perfusion pressure was calculated using the following equation: Mean ocular prefusion pressure = ⅔ mean arterial blood pressure − intraocular pressure.

Results

The current study included 60 patients who were diagnosed with end stage renal disease and undergone regular hemodialysis in the dialysis unit of ElMowasah University Hospital. Out of 60 patients, 41 patients representing 68.3% of the total sample number were males and 19 patients (31.6%) were females, 37 patients (61.6%) were aged between 18 – 40 years, and 23 patients (38.3%) aged between 40-65 years. In our study, IOP was significantly increased after the hemodialysis session in a subgroup of our patients . In addition, our current study showed decrease of OPP in a subgroup of patients . Also there was a high positive correlation between SBP and OPP through the three months, in addition there was high negative correlation between OPP and with UFR through the three months .

Table(1) : the distribution of the studied cases according to patients who showed an increase in IOP after hemodialysis within three months n/60

	Intraocular pressure	No	%	IOP (mmHg)				t	p
				Haemodialysis	Min-Max	Mean ±SD	Median		
1st month	Patients with Increased IOP	27	45	Pre	8-18	12.7±3.6	12	2.05	0.025*
				Post	11-20	15.6±3.2	15.5		
2nd month	Patients with Increased IOP	25	41.6	Pre	9-18	13.25±3.2	13	2.4	0.012*
				Post	10-21	14.62±4	13.5		
3rd month	Patients with Increased IOP	28	46.6	Pre	9-18	13.3±3.3	13	2.4	0.01*
				Post	12-21	16.5±3.2	16		

Table(2) : the distribution of the studied cases according to patients who showed decreased OPP after hemodialysis within three months n/60

	Ocular perfusion pressure	No	%	OPP (mmHg)				t	p
				Haemodialysis	Min-Max	Mean ±SD	Median		
1st month	Patients with decreased OPP	44	73	Pre	34-70	51.6±9.1	53	2.4	0.01*
				Post	15-63	41.6±11.5	41		
2nd month	Patients with decreased OPP	41	68	Pre	29-63	49.6±10.9	52.5		
				Post	22-59	40.2±9.7	41.5	2.02	0.025*
3rd month	Patients with decreased OPP	46	76	Pre	32-70	51.1±10.6	52		
				Post	19-59	39.7±10.3	39	2.4	0.01*

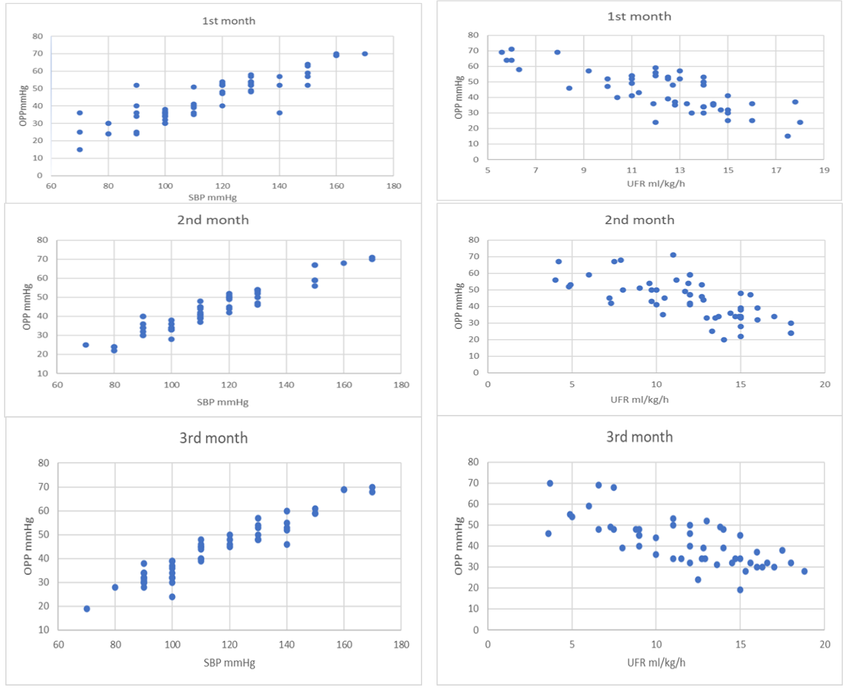

Fig (1): correlation between OPP and SBP and UFR

Conclusion

Intra ocular pressure (IOP) increased during hemodialysis and the OPP significantly decreased after HD, which may increase the risk of an ischemic state within the eye and increase risk of open angle glaucoma.