

Can Intraocular Pressure be a Predictor of Intracranial Pressure in Pediatric Patients with Pseudotumor Cerebri Syndrome?

Background

- ❖ Intracranial pressure (ICP) is the pressure exerted by neural tissue, cerebrospinal fluid, and blood within the closed craniospinal compartment.
- ❖ This study focused on pediatric patients with idiopathic intracranial hypertension, also known as pseudotumor cerebri syndrome (PTCS), which is a condition marked by elevated ICP without mass lesion, underlying infection, or malignancy.
- ❖ Currently, lumbar puncture opening pressure (LPOP) is the gold standard for measurement of ICP but is associated with invasive risks. LPOP can be difficult to execute properly, especially in emergency settings, and may result in cerebral herniation, intracranial hemorrhage, headache, and potential infection.
- ❖ Some studies have suggested a possible linear relationship between intraocular pressure (IOP) and ICP. Therefore, IOP may be a less invasive method of evaluating ICP in patients with PTCS.

Objectives

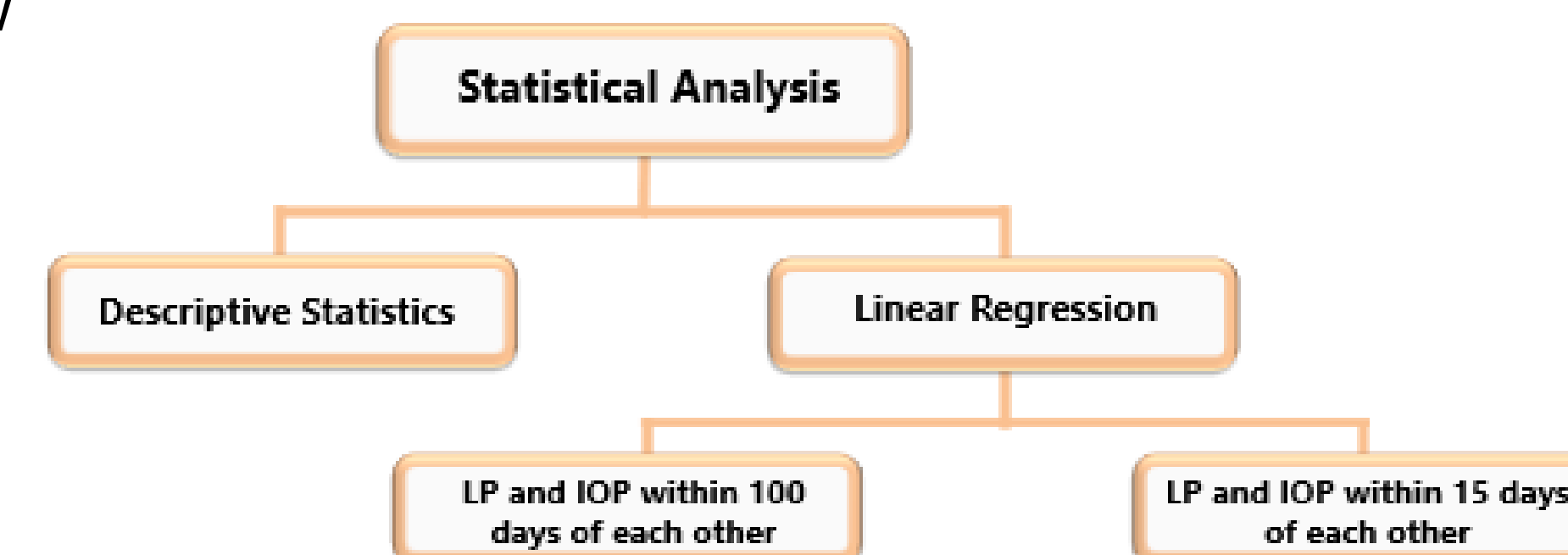
- ❖ The objective of this study is to evaluate the correlation of intracranial pressure lumbar puncture measurements with intraocular pressure measurements.
- ❖ The results of this study will contribute to the growing evidence of using non-invasive methods as a substitute for estimating intracranial pressure.
- ❖ Unlike previous studies, this study will help establish if the potential relationship of intracranial pressure with intraocular extends to pediatric patients with PTCS.

Hypothesis

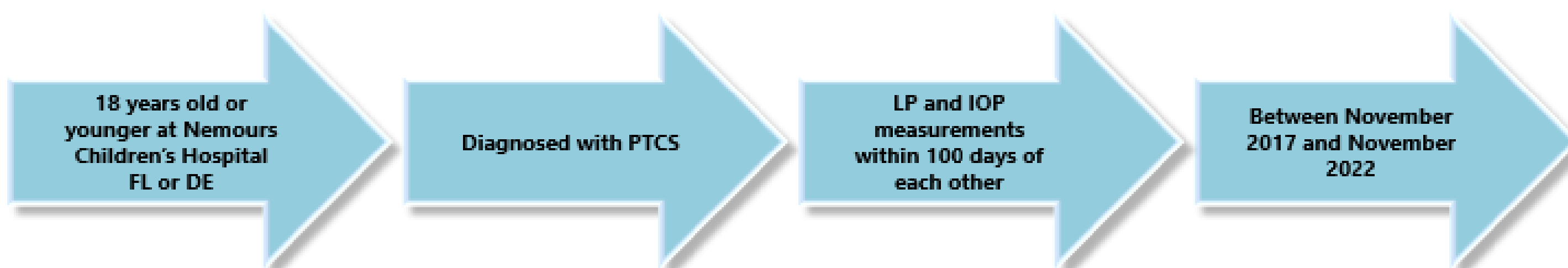
- ❖ The hypothesis of this study is that intraocular pressure is directly correlated with intracranial pressure.

Methods and Statistical Analysis

- ❖ A retrospective medical chart review
- ❖ 85 patients met inclusion criteria



Inclusion Criteria:



Graphs

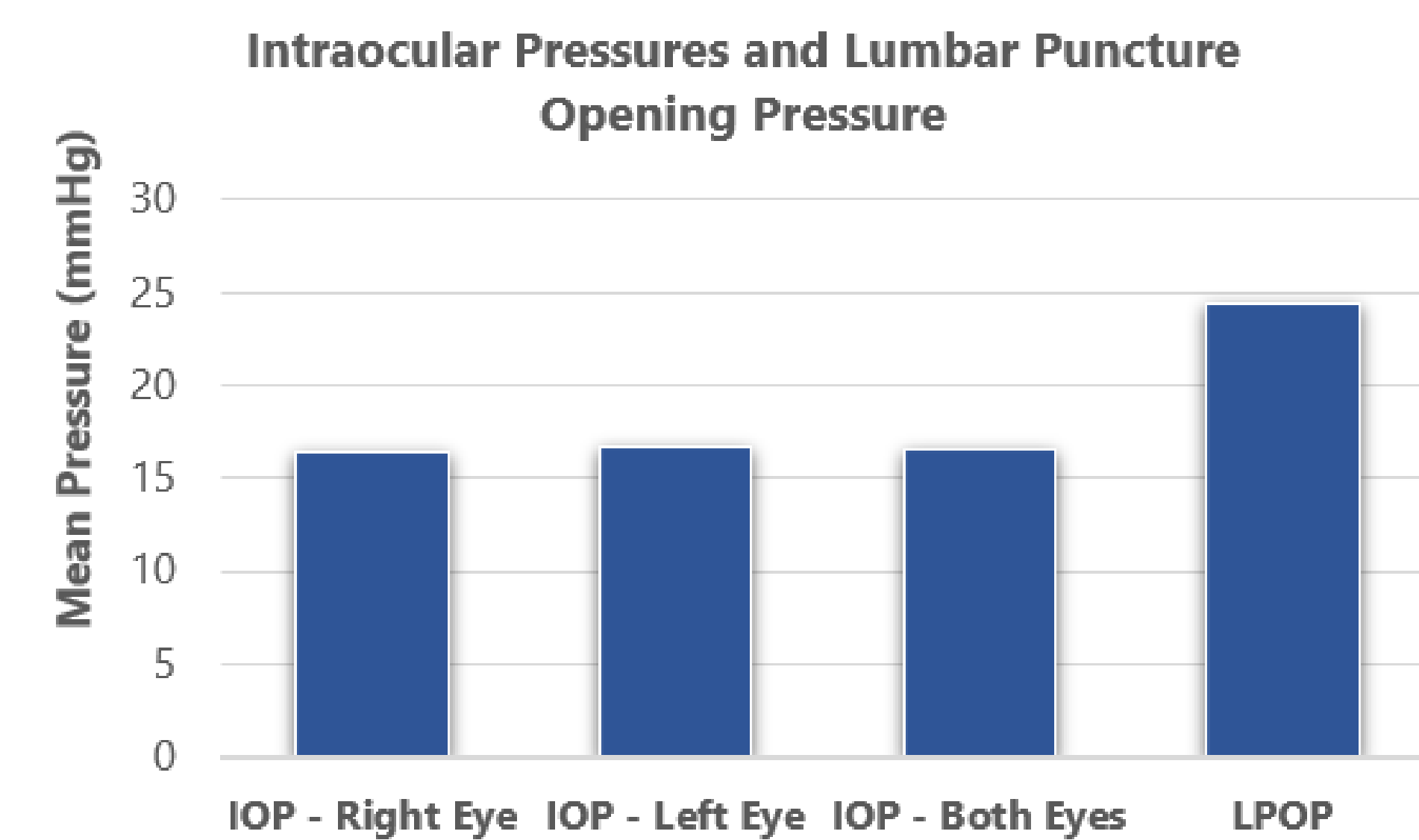


Figure 1: Mean Intraocular and Lumbar Puncture Opening Pressures

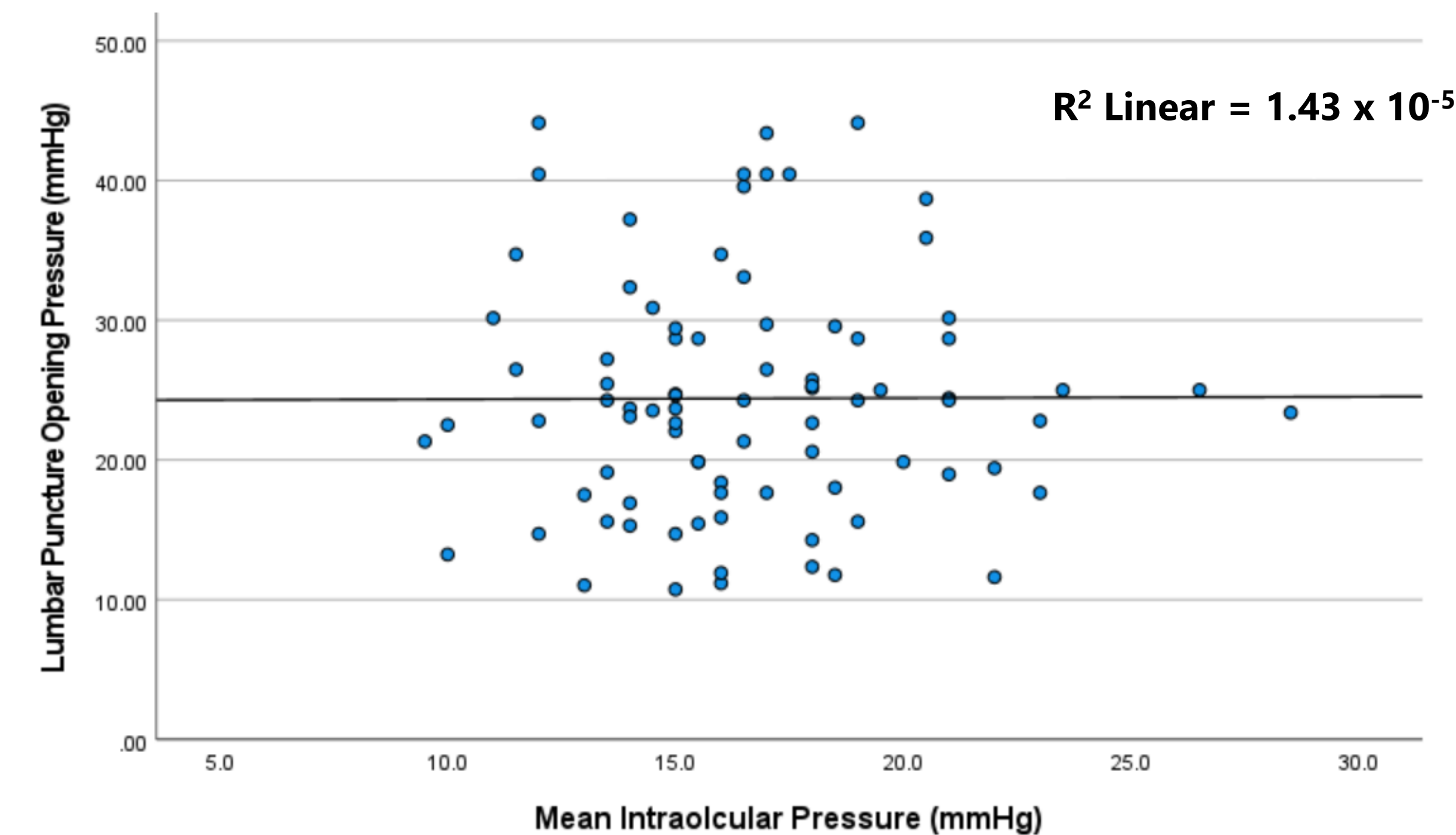


Figure 2: Linear Regression Model of Mean Intraocular and Lumbar Puncture Opening Pressure within 100 Days

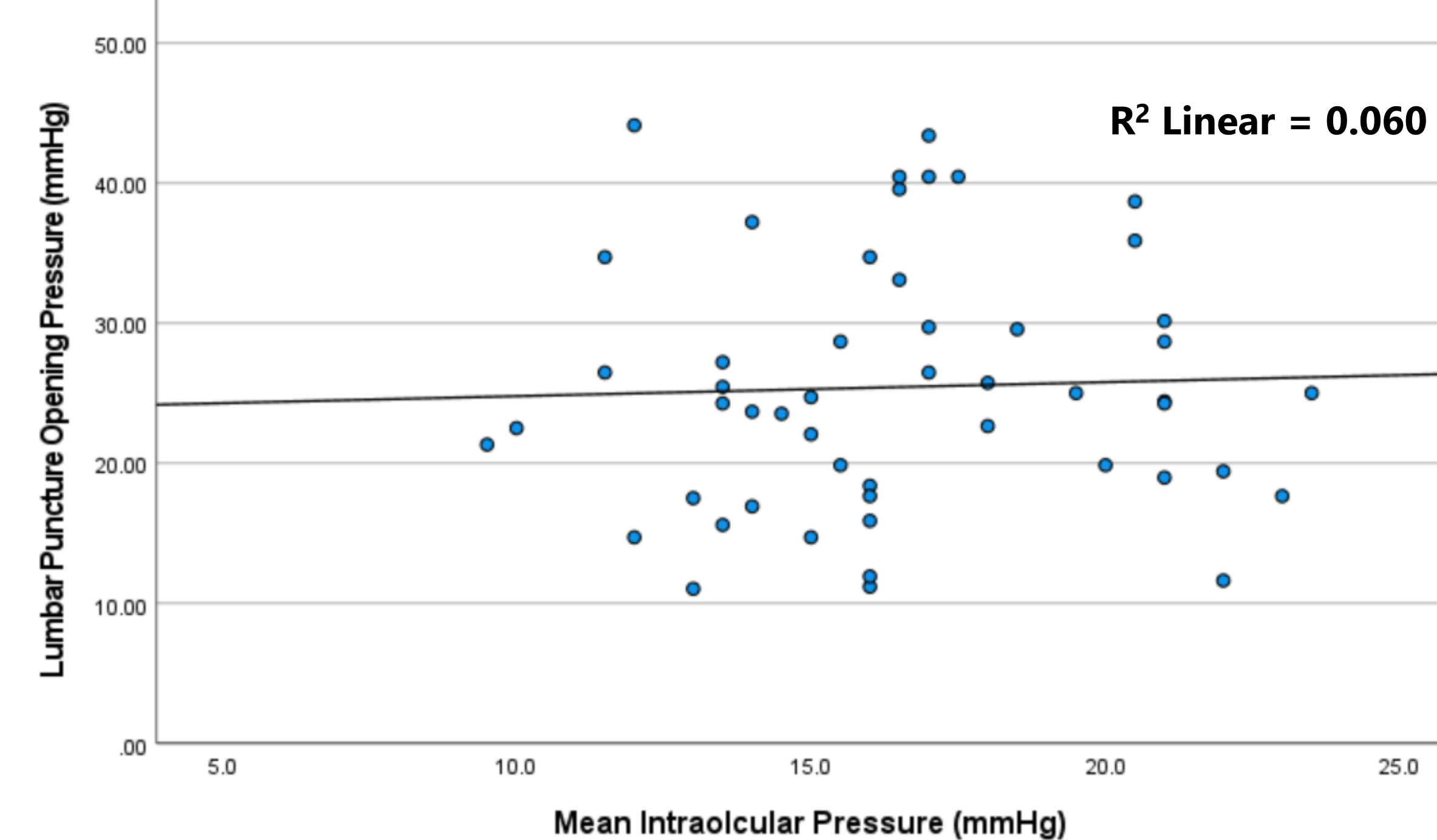


Figure 3: Linear Regression Model of Mean Intraocular and Lumbar Puncture Opening Pressure within 15 Days

Results

- ❖ The mean age at the time of LPOP measurement was 13.52 (± 3.71) years.
- ❖ The mean time difference between IOP and LPOP measurements was 19.18 (± 20.90) days.
- ❖ The mean LPOP was 24.41 (±8.47) mmHg and the mean IOP was 16.56 (± 3.59) mmHg.
- ❖ A linear regression demonstrated LPOP and IOP are not correlated ($R^2 = 1.43 \times 10^{-5}$, p-value = 0.973).
- ❖ Age differences within the study were not found to significantly affect differences in intracranial pressure.
- ❖ A subgroup analysis comprised of 48 patients that received LPOP and IOP readings within 14 days of each other (mean time difference of 5.25 days) did not have a significant correlation between LPOP and IOP ($R^2 = 0.060$, p-value = 0.051).

Discussion and Conclusion

- ❖ No significant correlation between IOP and LPOP was discovered.
- ❖ Due to the retrospective nature of this study, the time difference between LPOP and IOP measurements is a limitation and may impair an accurate correlation of the two pressures.
- ❖ Compared to previous studies that claim a correlation between LPOP and IOP, this study has a considerably higher mean LPOP and considerably lower mean younger age.
- ❖ Prospective studies should be considered that simultaneously measure IOP and LPOP to further evaluate IOP's ability to measure ICP status in pediatric patients with PTCS.
- ❖ A prospective project that assesses the correlation between tympanic membrane pressure and LPOP is also underway.

References

1. Li Z, Yang Y, Lu Y, et al. Intraocular pressure vs intracranial pressure in disease conditions: A prospective cohort study (beijing icop study). *BMC Neurol.* 2012;12:66. doi: 10.1186/1471-2377-12-66.
2. Garg P, Diwedi S, Mullick R. To Evaluate the Correlation between Intracranial Pressure and Intraocular Pressure in Neurological Patients: A Prospective Cohort Study. *Int J Ophthalmol Clin Res.* 2019;6:104. doi.org/10.23937/2378-346X/1410104