Example 104 : As shown in Figure 1, $\triangle ABC$ and AD are angle bisectors, O, P and Q *are the circumcentres of* ABC, $\triangle ABD$ and $\triangle ADC$ respectively $\triangle$. Prove: $OP = OQ$.

$$\frac{\frac{P-Q}{P-O}}{\frac{Q-O}{Q-P}}=\left(\frac{A-B}{P-O}\frac{A-C}{O-Q}\right)\left(\frac{P-Q}{A-D}\right)^2\frac{\frac{A-D}{A-B}}{\frac{A-C}{A-D}}$$