$$\cos\alpha+\cos\beta+\cos\gamma=1+4\sin\frac{\alpha}{2}\sin\frac{\beta}{2}\sin\frac{\gamma}{2}=\frac{R+r}{R},$$

$$\cos^2\alpha+\cos^2\beta+\cos^2\gamma=\frac{6R^2+4Rr+r^2-s^2}{2R^2},$$

$$\cos\beta\cos\gamma+\cos\gamma\cos\alpha+\cos\alpha\cos\beta=\frac{s^2-4R^2+r^2}{4R^2},$$

$$\cos\alpha\cos\beta\cos\gamma=\frac{s^2-(2R+r)^2}{4R^2},$$

$$(\cos\beta+\cos\gamma)(\cos\gamma+\cos\alpha)(\cos\alpha+\cos\beta)=\frac{r\,(s^2+2Rr+r^2)}{4R^3},$$

$$\cos^3\alpha+\cos^3\beta+\cos^3\gamma=\frac{(2R+r)^3-3rs^2}{4R^3}-1,$$

$$\frac{\cos\beta+\cos\gamma}{\cos\alpha}+\frac{\cos\gamma+\cos\alpha}{\cos\beta}+\frac{\cos\alpha+\cos\beta}{\cos\gamma}=\frac{(R+r)(s^2-4R^2+r^2)}{R\,[s^2-(2R+r)^2]}-3,$$