1)

Let P1 and P2 be the true population proportions of number of patients are contracted COVID-19 who are received a tratment group and placebo (Control ) group respectively.

To test,

**Ho:P1=P2 vs**

**H1: P1≠P2**

> n=c(17411,17511)

> x=c(8,162)

> prop.test(x,n,conf.level=0.999,alternative="less")

2)

2-sample test for equality of proportions with continuity correction

data: x out of n

X-squared = 137.5, df = 1, **p-value < 2.2e-16**

alternative hypothesis: less

99.9 percent confidence interval:

-1.000000000 -0.006443204

sample estimates:

prop 1 prop 2

0.0004594796 0.0092513277

Decision rule: We reject Ho at α % significance level

If, P-value <α

Here,α=0.001 i.e. 0.1% and **p-value < 2.2e-16**

Here, P-value< α

**Therefore we reject Ho at 0.1% significance level**

**3) R-Code**

> n=c(17411,17511)

> x=c(8,162)

> prop.test(x,n,conf.level=0.999,alternative="less")

**4)**

**Conclusion:There is sifficient evidence at 0.1% level to conclude that the vaccine is effective.**