

ToothGrowth

Bohdan Horak

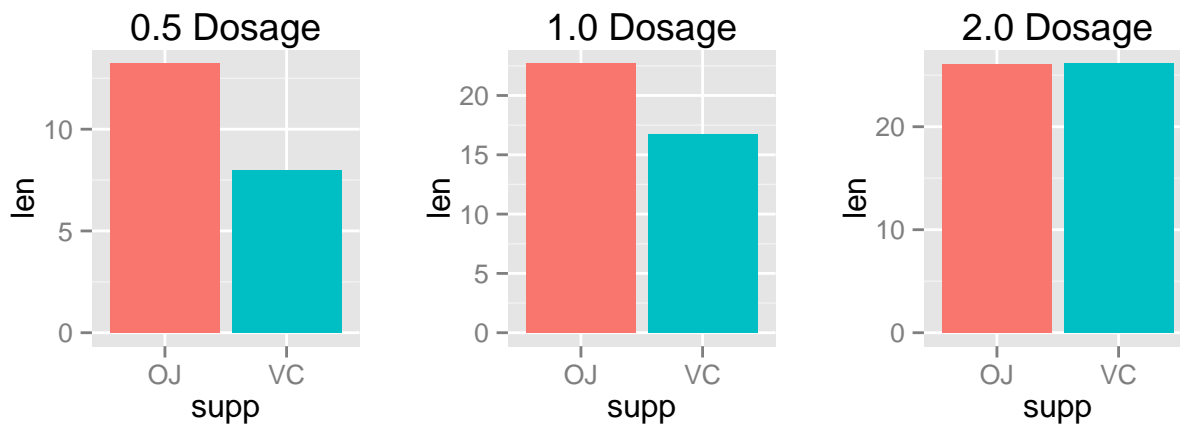
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Exploratory

Here is a summary of the data.

```
##      len      supp      dose
##  Min.   : 4.2    OJ:30    Min.   :0.50
##  1st Qu.:13.1   VC:30    1st Qu.:0.50
##  Median :19.2                Median :1.00
##  Mean   :18.8                Mean   :1.17
##  3rd Qu.:25.3                3rd Qu.:2.00
##  Max.   :33.9                Max.   :2.00
```

Here are a couple bar plots demonstrating the differences between the two supplements, by dosage.



As we can see “OJ” either outperforms or equals the “VC” supplement. We can’t say so conclusively so we do some inference.

Inference

For this data set I will perform a hypothesis test on whether the means of the “OJ” and “VC” are equal. We assume a significance level=5%, that is if the “p” value from our tests is less than 5% we can reject the null hypothesis that there is no difference between the means. Note we assume equal variance in each test.

0.5 Dosage

```
t.test(len~supp, paired=F, var.equal=F, data=data_0.5)
```

```
##
## Welch Two Sample t-test
```

```
##
## data: len by supp
## t = 3.17, df = 14.97, p-value = 0.006359
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  1.719 8.781
## sample estimates:
## mean in group OJ mean in group VC
##          13.23          7.98
```

As the result in p value is less than 5% we can say that OJ is statistically better at encouraging tooth growth than VC is.

1.0 Dosage

```
t.test(len~supp, paired=F, var.equal=F, data=data_1)
```

```
##
## Welch Two Sample t-test
##
## data: len by supp
## t = 4.033, df = 15.36, p-value = 0.001038
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  2.802 9.058
## sample estimates:
## mean in group OJ mean in group VC
##          22.70          16.77
```

As the result in p value is less than 5% we can say that OJ is statistically better at encouraging tooth growth than VC is.

2.0 Dosage

```
t.test(len~supp, paired=F, var.equal=F, data=data_2)
```

```
##
## Welch Two Sample t-test
##
## data: len by supp
## t = -0.0461, df = 14.04, p-value = 0.9639
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -3.798 3.638
## sample estimates:
## mean in group OJ mean in group VC
##          26.06          26.14
```

As the result in p value is greater than 5% we can say that OJ is not statistically different at encouraging tooth growth than VC is.