Stat Inference Tooth Growth

Tooth Growth Analysis

Summary of the data & exploratory data analysis

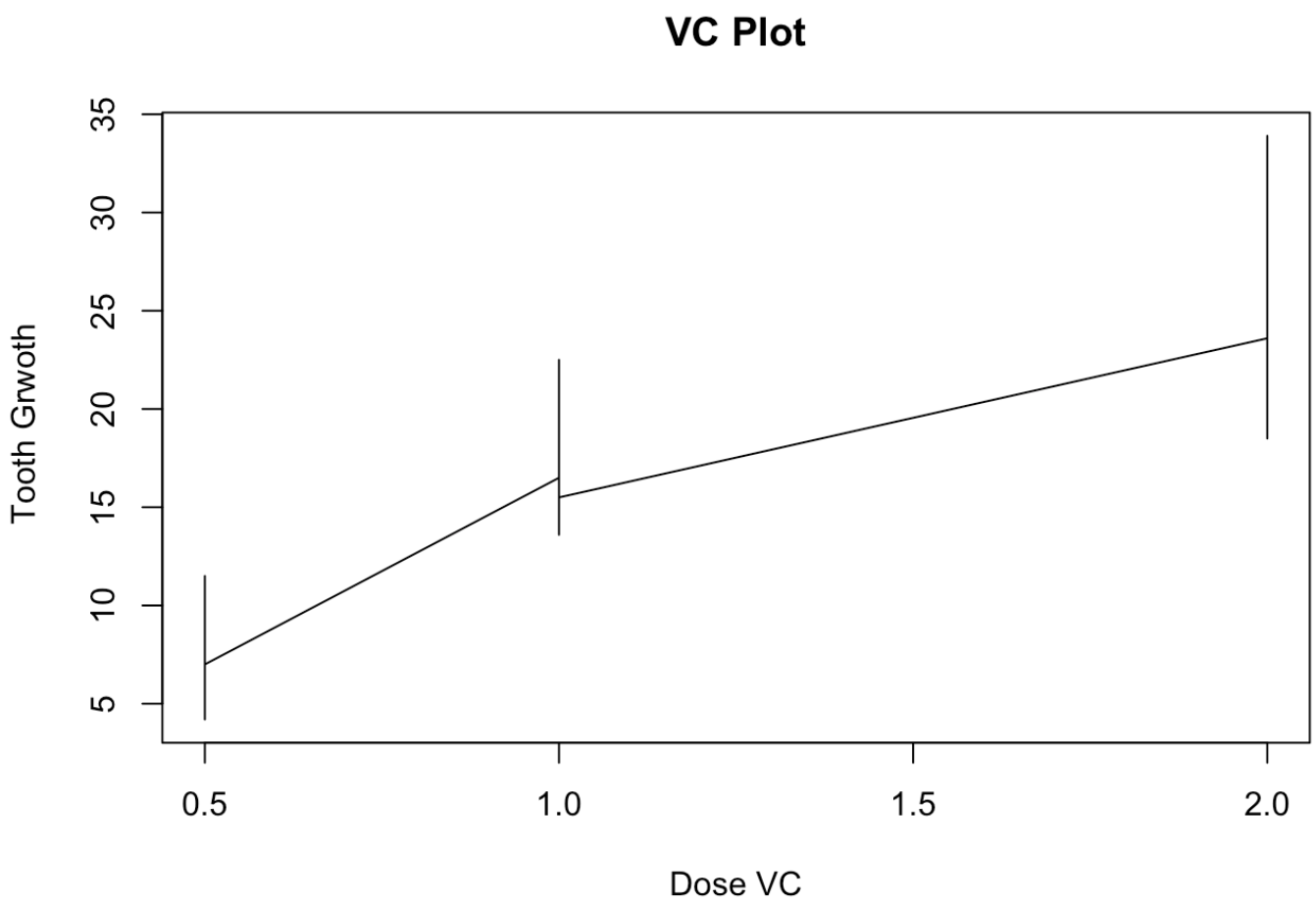
Compare tooth growth by supp and dose

```
library(datasets)
str(ToothGrowth)
```

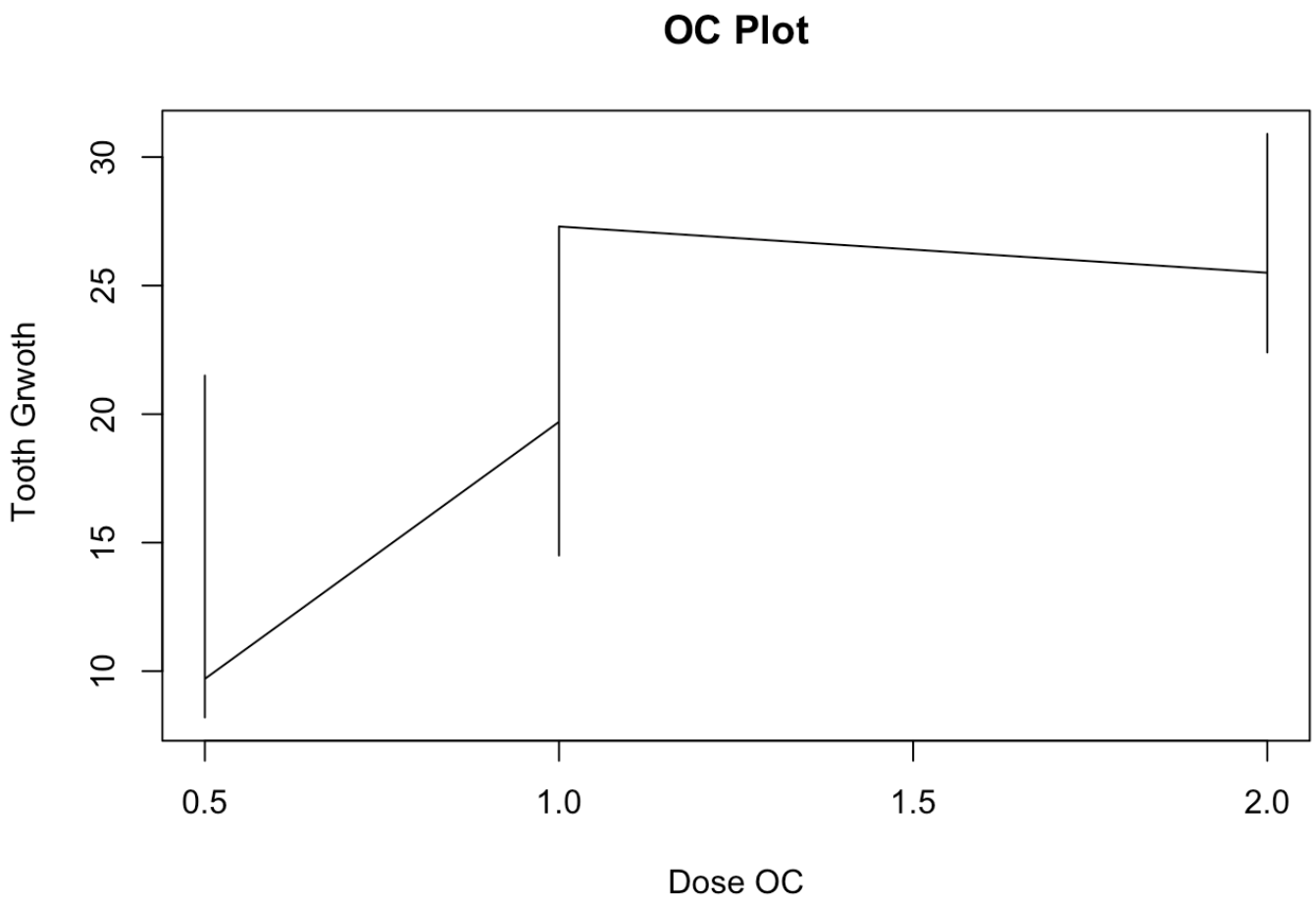
```
## 'data.frame':    60 obs. of  3 variables:
##  $ len : num  4.2 11.5 7.3 5.8 6.4 10 11.2 11.2 5.2 7 ...
##  $ supp: Factor w/ 2 levels "OJ","VC": 2 2 2 2 2 2 2 2 2 2 ...
##  $ dose: num  0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 ...
```

```
OJ <- subset(ToothGrowth, supp == "OJ")
VC <- subset(ToothGrowth, supp == "VC")
```

```
plot (VC$len ~ VC$dose, type="l", ann=FALSE)
title("VC Plot",xlab=" Dose VC ",ylab=" Tooth Grwoth")
```




```
plot (OJ$len ~ OJ$dose, type="l", ann=FALSE)
title("OC Plot",xlab=" Dose OC ",ylab=" Tooth Grwoth")
```



Increased vitamin C dosages (in OJ, orange juice or VC, pure ascorbic acid form) appear to be an effective supplement of tooth growth.

T-tests at each dosage levels

The T-test at 0.5 mg yields the following:

```
  t.test(len ~ supp, ToothGrowth[ToothGrowth$dose == .5, ])
```

```
##
##  Welch Two Sample t-test
##
## data:  len by supp
## t = 3.1697, df = 14.969, p-value = 0.006359
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  1.719057 8.780943
## sample estimates:
## mean in group OJ mean in group VC
##            13.23             7.98
```

```
t.test(len ~ supp, ToothGrowth[ToothGrowth$dose == 1, ])
```

```
##
##  Welch Two Sample t-test
##
## data:  len by supp
## t = 4.0328, df = 15.358, p-value = 0.001038
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  2.802148 9.057852
## sample estimates:
## mean in group OJ mean in group VC
##            22.70            16.77
```

```
t.test(len ~ supp, ToothGrowth[ToothGrowth$dose == 2, ])
```

```
##
##  Welch Two Sample t-test
##
## data:  len by supp
## t = -0.046136, df = 14.04, p-value = 0.9639
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -3.79807  3.63807
## sample estimates:
## mean in group OJ mean in group VC
##            26.06            26.14
```

From the T-tests analysis , we see statistically significant p-values that for dosages of 0.5 mg and 1 mg, orange juice is more effective for tooth growth than ascorbic acid.

Conclusions

From our basic data analysis above, we see that increased vitamin C dosages (in OJ, orange juice or VC, pure ascorbic acid form) is an effective supplement of tooth growth.