

# Statistical Inference: Parametric Tests

## Assignment

### BACKGROUND:

In a randomized control trial, 32 patients were divided into two groups: A and B. Group A received test drug whereas group B received placebo. The variable of interest was 'Change in pain level' measured by visual analogue scale (VAS) before treatment and after 3 days of treatment.

### QUESTIONS-

1. Import VAS DATA and name it as pain\_vas. Check for normality of the data.
2. Is post treatment VAS score significantly less as compared to 'before treatment' VAS score for Group A?
3. Is post treatment VAS score significantly less as compared to 'before treatment' VAS score for Group B?
4. Is the average change in pain level for group 'A' significantly more than group 'B'?
5. Present change in pain level for each group using box-whisker plot.

### SOLUTIONS

#Q1. Import VAS DATA and name it as pain\_vas. Check for normality of the data.

##A.

```
pain_vas<-read.csv(file.choose(),header = T)
```

```
head(pain_vas)
```

```
str(pain_vas)
```

```
shapiro.test(pain_vas$VAS_before)
```

```
shapiro.test(pain_vas$VAS_after)
```

```
library(nortest)
```

```
lillie.test(pain_vas$VAS_before)
```

```
lillie.test(pain_vas$VAS_after)
```

#Interpretation:Since p-value >0.05, normality can be assumed

#Q2. Is post treatment VAS score significantly less as compared to 'before treatment' VAS score for Group A?

##A.

```
groupA_data<-subset(pain_vas,Group=="A")
```

```
t.test(groupA_data$VAS_after,groupA_data$VAS_before,alternative =
```

```
"less",paired=TRUE)
```

#Interpretation:Since p-value is less than 0.05, post treatment VAS score is significantly less as compared to 'before treatment' VAS score for Group A

#Q3. Is post treatment VAS score significantly less as compared to 'before treatment' VAS score for Group B?

##A.

```
groupB_data<-subset(pain_vas,Group=="B")
```

```
t.test(groupB_data$VAS_after,groupB_data$VAS_before,alternative =  
"less",paired=TRUE)
```

#Interpretation:Since p-value is less than 0.05, post treatment VAS score is significantly less as compared to 'before treatment' VAS score for Group B

#Q4. Is the average change in pain level for group 'A' significantly more than group 'B'?

##A.

```
pain_vas$change<-(pain_vas$VAS_before-pain_vas$VAS_after)
```

```
t.test(change~Group,data=pain_vas,alternative="greater",var.equal=TRUE)
```

#Interpretation:Since p-value is less than 0.05, average change in pain level for group 'A' is significantly more than group 'B'

#Note:Above t test result is based on the assumption of equal variance in two groups.

#Note:We run F test to check equality in variances

```
var.test(change~Group,data=pain_vas,alternative="two.sided")
```

#Interpretation:F test indicates unequal variances. Hence, we again run t test with var.equal=FALSE

```
t.test(change~Group,data=pain_vas,alternative="greater",var.equal=FALSE)
```

#Interpretation:Since p-value is less than 0.05, average change in pain level for group 'A' is significantly more than group 'B'

#Q5. Present change in pain level for each group using box-whisker plot

##A.

```
boxplot(change~Group,data=pain_vas,main="Change in pain  
level",xlab="GROUP",ylab="CHANGE",col="red")
```