

# Paired-Sample T-Test: Glycemia Before and After Program

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## Load Libraries

We use the tidyverse package for potential data manipulation and plotting.

```
library(tidyverse)

# Import Data We load patient data containing glycemia levels before and after a health intervention.
# Set the working directory (modify as needed)
setwd("C:/Users/O&1/OneDrive/Documents/R-Youtube")

# Read the data
my_data <- read.csv("patients-two.csv")

# Preview the dataset
head(my_data)
```

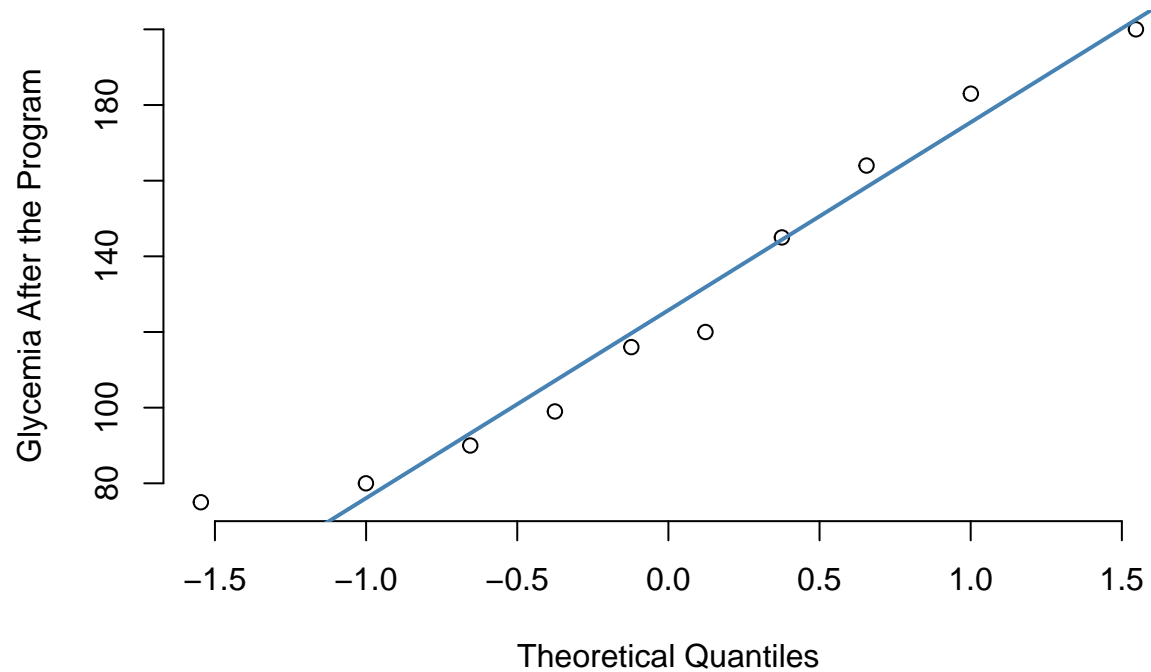
	name	gender	BMI	glycemia.before	glycemia.after
## 1	1	1	24.1	98	90
## 2	2	2	25.0	117	116
## 3	3	1	27.6	98	99
## 4	4	1	23.2	85	80
## 5	5	2	28.2	139	120
## 6	6	2	26.4	147	145

## Check Normality of Differences

We assume normality of the differences between before and after measurements. We use a Q-Q plot for the “after” values as an approximation.

```
qqnorm(my_data$glycemia.after,
       ylab = "Glycemia After the Program",
       pch = 1, frame = FALSE)
qqline(my_data$glycemia.after, col = "steelblue", lwd = 2)
```

## Normal Q-Q Plot

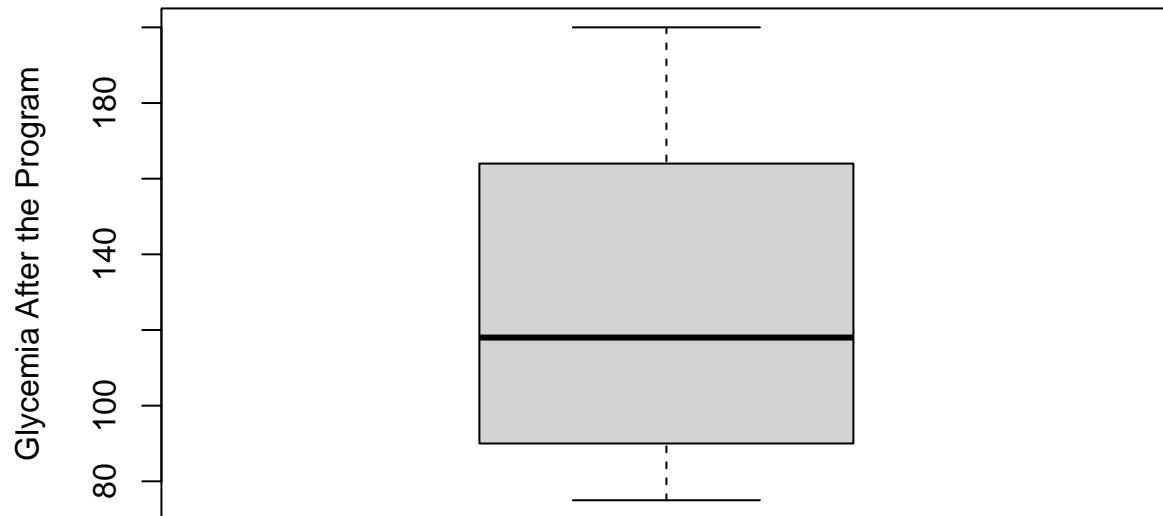


## Check for Outliers

We use a boxplot to detect any potential outliers in post-program glycemia.

```
boxplot(my_data$glycemia.after,  
        ylab = "Glycemia After the Program",  
        main = "Boxplot of Glycemia After",  
        col = "lightgray")
```

## Boxplot of Glycemia After



## Summary Statistics

```
summary(my_data)
```

```
##      name      gender      BMI      glycemia.before
## Min.   : 1.00   Min.   :1.000   Min.   :21.30   Min.   : 70.0
## 1st Qu.: 3.75   1st Qu.:1.000   1st Qu.:24.32   1st Qu.: 98.0
## Median : 6.50   Median :1.000   Median :25.85   Median :128.0
## Mean   : 6.50   Mean   :1.417   Mean   :25.88   Mean   :133.3
## 3rd Qu.: 9.25   3rd Qu.:2.000   3rd Qu.:27.60   3rd Qu.:163.5
## Max.   :12.00   Max.   :2.000   Max.   :30.10   Max.   :220.0
##
##      NA's :2      NA's :2
## glycemia.after
## Min.   : 75.00
## 1st Qu.: 92.25
## Median :118.00
## Mean   :127.20
## 3rd Qu.:159.25
## Max.   :200.00
## NA's   :2
```

## Paired-Sample T-Test

We perform a paired-sample t-test to determine whether the glycemia level changed significantly after the program.

## Hypotheses

Null Hypothesis ( $H_0$ ): Mean glycemia before = after

Alternative Hypothesis ( $H_1$ ): Mean glycemia before  $\neq$  after

## Run the Test

```
result <- t.test(my_data$glycemia.before, my_data$glycemia.after, paired = TRUE)
result

##
## Paired t-test
##
## data: my_data$glycemia.before and my_data$glycemia.after
## t = 2.3969, df = 9, p-value = 0.0401
## alternative hypothesis: true mean difference is not equal to 0
## 95 percent confidence interval:
##  0.3429693 11.8570307
## sample estimates:
## mean difference
##                6.1
```

## Interpretation

If the p-value is less than 0.05, we reject  $H_0$  and conclude that the program had a statistically significant effect on glycemia levels.

## Conclusion

This report explored pre/post glycemia data using visualization and hypothesis testing. The paired t-test assessed whether the intervention significantly changed glycemia levels among patients.

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