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Portfolio Assignment 2

A study of Body Image of pregnant women

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# Introduction

A randomised trial of the effects of an appropriate exercise regime on a woman’s perception of her body during and after a normal, healthy singleton pregnancy was carried out in Ayrshire, Scotland. Sixty women, recently pregnant for the first time, were recruited and randomised to be controls or to attend weekly exercise regimes (designed to be suitable for women throughout pregnancy). Otherwise every one of the 60 women were to carry on the pregnancy as they saw fit including any exercise.

Each woman filled in a questionnaire as to how she perceived her own body at two distinct times; one at 12 weeks into the pregnancy and the other at 12 weeks after the baby was born (all births produced healthy babies). One component of this questionnaire allowed the calculation of a measure of the woman’s “body image” with high values on this scale of 0 to 40 denoting women who have a good perception of their own body image.

**Body Image**

‘Early Preg BI ‘contains the Body Image scores at 12 weeks into pregnancy

‘After Preg BI ‘contains the Body Image scores at 12 weeks after birth

‘Exercise Regime’ contains the “Treatment” i.e. 1 for Control and 2 for Exerciser.

# Abbreviation Used

BI – Body Index

# Do ‘control’ women tend on average to show a reduction in ‘body image’ from early pregnancy to after pregnancy?



In general, we see that for control group Body Index of women is reduced after pregnancy. There are however few exceptions overall 4 subjects out of 30 shows improvement in Body Index after pregnancy out which one of them shows a very high increase in body index and can be treated as an outlier



Box plot confirms the observation of scatter plot, we see that both the boxes does not overlap each other, and Early Pregnancy box is towards right of After Pregnancy box and hence early pregnancy BI values are much higher than After pregnancy BI values in control group. Also we can see the existence of one outlier from the above group where the after pregnancy BI value is too high as compared to all other values.

Descriptive Statistics: Early Preg BI\_Control, After Preg BI\_Control

Statistics

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Variable | N | N\* | Mean | SE Mean | StDev | Variance | Minimum | Q1 | Median |
| Early Preg BI\_Control | 30 | 0 | 24.133 | 0.967 | 5.296 | 28.051 | 12.000 | 20.750 | 23.500 |
| After Preg BI\_Control | 30 | 0 | 15.70 | 1.00 | 5.50 | 30.29 | 7.00 | 12.50 | 15.00 |

|  |  |  |
| --- | --- | --- |
| Variable | Q3 | Maximum |
| Early Preg BI\_Control | 28.250 | 34.000 |
| After Preg BI\_Control | 19.00 | 30.00 |

From descriptive statistics we can see that both Mean, and Median have similar values and we can say that the data is normally distributed.

Paired T-Test and CI: Early Preg BI\_Control, After Preg BI\_Control

Descriptive Statistics

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sample | N | Mean | StDev | SE Mean |
| Early Preg BI\_Control | 30 | 24.13 | 5.30 | 0.97 |
| After Preg BI\_Control | 30 | 15.70 | 5.50 | 1.00 |

Estimation for Paired Difference

|  |  |  |  |
| --- | --- | --- | --- |
| Mean | StDev | SE Mean | 95% CI for μ\_difference |
| 8.43 | 7.98 | 1.46 | (5.45, 11.41) |

*µ\_difference: mean of (Early Preg BI\_Control - After Preg BI\_Control)*

Test

|  |  |
| --- | --- |
| Null hypothesis | H₀: μ\_difference = 0 |
| Alternative hypothesis | H₁: μ\_difference ≠ 0 |

|  |  |
| --- | --- |
| T-Value | P-Value |
| 5.79 | 0.0000029 |

H0: Difference between average body image pre and post pregnancy is same

HA: Difference between average body image pre and post pregnancy is not same

α = 0.05 (95% confidence interval)

We can see that from 95% CI that 0 does not lie between 5.45 and 11.41 and hence there is a difference between early and after pregnancy BI values of women in control group. Also, the confidence interval is more towards positive and hence early pregnancy values of Body Index are much greater than post pregnancy values of Body index of women in control group.

P-value (0.0000029) in the above Hypothesis test is less than 0.05 and hence we can say that there is evidence towards rejection of Null Hypothesis. Which means on an average there is a significance difference in Body Index of woman in control group at early and post pregnancy stages.

From the above tests we can say that body index or body image of women who were not given an exercise regime and were part of the control, reduces after pregnancy i.e. women tend to have a bad perception of their body image after pregnancy.

# Do women undergoing this exercise regime tend on average to show a reduction in ‘body image’ from early pregnancy to after pregnancy?



From the scatterplot we can see that for exercise group reduction in Body Index is more or less parallel to the central line some women show reduction while some shows increase in the body index. Plot is scattered in a wide area with points both above and below line, so we can say that in general Body Index might be same. We need to perform additional tests stated below to confirm this observation.



Box plot confirms the observation of scatterplot, there is a high level of overlap between two boxes and hence early pregnancy body index values can be considered similar to the after-pregnancy body index values for woman in exerciser group.

Statistics

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Variable | N | N\* | Mean | SE Mean | StDev | Variance | Minimum | Q1 | Median |
| Early Preg BI\_Exerciser | 30 | 0 | 21.53 | 1.01 | 5.52 | 30.46 | 14.00 | 16.75 | 21.00 |
| After Preg BI\_Exerciser | 30 | 0 | 20.100 | 0.832 | 4.559 | 20.783 | 11.000 | 16.000 | 20.500 |

|  |  |  |
| --- | --- | --- |
| Variable | Q3 | Maximum |
| Early Preg BI\_Exerciser | 27.00 | 30.00 |
| After Preg BI\_Exerciser | 23.250 | 29.000 |

Descriptive statistics shows that Mean and Median of is similar for the given data and hence we can say that data is normally distributed.

Paired T-Test and CI: Early Preg BI\_Exerciser, After Preg BI\_Exerciser

Descriptive Statistics

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sample | N | Mean | StDev | SE Mean |
| Early Preg BI\_Exerciser | 30 | 21.53 | 5.52 | 1.01 |
| After Preg BI\_Exerciser | 30 | 20.10 | 4.56 | 0.83 |

Estimation for Paired Difference

|  |  |  |  |
| --- | --- | --- | --- |
| Mean | StDev | SE Mean | 95% CI for μ\_difference |
| 1.433 | 5.469 | 0.998 | (-0.609, 3.475) |

*µ\_difference: mean of (Early Preg BI\_Exerciser - After Preg BI\_Exerciser)*

Test

|  |  |
| --- | --- |
| Null hypothesis | H₀: μ\_difference = 0 |
| Alternative hypothesis | H₁: μ\_difference ≠ 0 |

|  |  |
| --- | --- |
| T-Value | P-Value |
| 1.44 | 0.162 |

H0: Difference between average body image pre and post pregnancy is same

HA: Difference between average body image pre and post pregnancy is not same

α = 0.05 (95% confidence interval)

From the 95% Confidence Interval we can see that 0 lies between -0.609 and 3.475 and hence there is no significance difference between Body Index values of early pregnancy and after pregnancy of woman in exerciser group.

Also, P-Value (0.162) is greater than 0.05 hence there is not enough evidence to reject Null Hypothesis and hence we can say that there is no significance difference between early pregnancy Body Index value and After Pregnancy Body Index value of women in exerciser group.

From the above tests we can say that body index or body image of women who were given an exercise regime does not reduces even after pregnancy. Thus, the perception of women about their body image remains same post pregnancy.

# Is there any significant difference in the average reduction in ‘body image’ between control and exercising women?



From the scatterplot it can be seen that Women in control group shows a greater amount of reduction in body image as compared to Women who were provided an appropriate exercise regime as most of the blue circles lies below the line of equality. However, there is an exception of 1 subject in control group who shows an excessive increase in body image post pregnancy.

It is unclear about exerciser group some of the subjects shows reduction while some of them shows an increase in body image as the red squares in scatterplot are scattered bot above and below line of equality. Exercise group show changes that are in general parallel to line of equality and thus suggesting a consistency or no change

We will be performing additional tests to confirm our findings.



Box plot confirms the observations of scatterplot:

Difference in the above graph describes Post Pregnancy Body Index – Pre Pregnancy Body Index value.

For control group there is a significant reduction in body image as the 0-reference line is not contained in the box. Also, there is one outlier for the control group for which difference is negative.

For exerciser group there is no significant change in the body image as the 0-reference line lies passes through the box of exerciser group.

Also, both the box does not overlap each other and hence we can say that there is a significance difference in average reduction in body image between women in control and exerciser group.

Descriptive Statistics: Difference

Statistics

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Variable | Exercise Group | N | N\* | Mean | SE Mean | StDev | Variance | Minimum | Q1 | Median |
| Difference | Control | 30 | 0 | 8.43 | 1.46 | 7.98 | 63.70 | -13.00 | 4.00 | 9.50 |
|  | Exerciser | 30 | 0 | 1.433 | 0.998 | 5.469 | 29.909 | -10.000 | -2.000 | 1.000 |

|  |  |  |  |
| --- | --- | --- | --- |
| Variable | Exercise Group | Q3 | Maximum |
| Difference | Control | 14.50 | 21.00 |
|  | Exerciser | 6.000 | 13.000 |

From the summary statistics we can see that for both the groups mean value is similar to median value and hence we can say that values are normally distributed.

Also, we can see the impact of outlier in control group as the difference between Mean and Median is comparatively higher in control group than in exerciser group.

Two-Sample T-Test and CI: Difference\_Control, Difference\_Exerciser

Method

|  |
| --- |
| μ₁: mean of Difference\_Control |
| µ₂: mean of Difference\_Exerciser |
| Difference: μ₁ - µ₂ |

*Equal variances are not assumed for this analysis.*

Descriptive Statistics

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sample | N | Mean | StDev | SE Mean |
| Difference\_Control | 30 | 8.43 | 7.98 | 1.5 |
| Difference\_Exerciser | 30 | 1.43 | 5.47 | 1.0 |

Estimation for Difference

|  |  |
| --- | --- |
| Difference | 95% CI for Difference |
| 7.00 | (3.45, 10.55) |

Test

|  |  |
| --- | --- |
| Null hypothesis | H₀: μ₁ - µ₂ = 0 |
| Alternative hypothesis | H₁: μ₁ - µ₂ ≠ 0 |

|  |  |  |
| --- | --- | --- |
| T-Value | DF | P-Value |
| 3.96 | 51 | 0.00023 |

H0: Difference between average body image reduction in control and exerciser group is same

HA: Difference between average body image reduction in control and exerciser group is not same

α = 0.05 (95% confidence interval)

From the 95% Confidence Interval we can see that 0 does not lie between 3.45 and 10.55 hence there is significance difference between reduction in body image between exercise and control group.

Also, from the P-Value (0.00023) is less than 0.05 and hence there is a strong evidence towards rejecting null hypothesis and we can say that there is significance difference between two means.

# Conclusion

From the above analysis we can conclude that the perception of body for women who were subjected to regime of exercise does not changes even after pregnancy, while the perception of good body for women who were not subjected to any exercise generally reduces. Hence, we can say that regular exercise help woman maintains their body during and after pregnancy.