

Cover Page of Statistical Analysis Plan (SAP)

Official Study Title

Effect of Joint Mobilization and Movement Control Exercises on Shoulder Pain and Function in Fast Bowlers (RCT)

Statistical Analysis Plan

The purpose of the statistical analysis is to evaluate the effectiveness of Mulligan Mobilization with Movement combined with kinetic medial rotation control exercises on pain, shoulder range of motion, and functional outcomes among fast bowlers.

NCT IDENTIFIER NUMBER: NCT07229274

DATE:

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Investigator Name: Hammad Haider

Institute: Lahore University of Biological and Applied Sciences

Study Outcomes

- Shoulder pain intensity
- Shoulder range of motion (ROM)
- Shoulder functional performance

Data Collection

Data will be collected at baseline and after completion of the six-week intervention program. All outcome measurements will be recorded using standardized assessment procedures.

Statistical Software

Data analysis will be performed using Statistical Package for Social Sciences (SPSS) version 25.0.

Descriptive Statistics

Descriptive statistics will be used to summarize demographic and baseline characteristics of participants. Continuous variables will be presented as mean $\pm$ standard deviation (SD), while categorical variables will be presented as frequencies and percentages.

Assessment of Normality

Data distribution will be assessed using the Shapiro–Wilk test and visual inspection methods including histograms and Q-Q plots. Normality assumptions will be verified before selection of statistical tests.

Inferential Statistic

For normally distributed data:

- Paired sample t-tests will be used for within-group comparisons.
- Independent sample t-tests will be used for between-group comparisons.

For non-normally distributed data:

- Wilcoxon signed-rank tests will be used for within-group comparisons.
- Mann–Whitney U tests will be used for between-group comparisons.

Repeated measures ANOVA may be applied where appropriate to compare outcome measures across different time points.

Level of Significance

A p-value of less than 0.05 will be considered statistically significant. All statistical tests will be two-tailed.

Missing Data Handling

Incomplete or missing data will be assessed before analysis. If missing values are minimal, complete-case analysis will be performed. If necessary, appropriate imputation methods will be considered to minimize bias.

Adjustment for Multiple Comparisons

Where multiple outcome variables are analyzed simultaneously, Bonferroni correction or other suitable adjustment methods will be applied to control the risk of Type I error.

Assumptions Verification

Statistical assumptions including normality, homogeneity of variance, and independence of observations will be assessed before conducting parametric analyses. Appropriate non-parametric alternatives will be used if assumptions are violated.

Data Presentation

Results will be presented using tables, graphs, and summary statistics to demonstrate changes in pain, range of motion, and shoulder function before and after intervention.