ABSTRACT

Background: The trunk musculature is essential for spinal stability and efficient biomechanical function. This study compares the effectiveness of isometric and isotonic core exercises over six weeks on trunk endurance in healthy college students at Brainware University, Barasat, addressing a gap in existing research.

Methods: A quasi-experimental pre–post comparative design involved 56 asymptomatic college students (aged 18–25 years; BMI 18.5–24.9 kg/m²) divided into an isometric (Group A) and an isotonic group (Group B), each with 28 participants. They completed supervised exercise sessions three times weekly for six weeks. Trunk endurance was measured at baseline (Week 0) and post-intervention (Week 7) using four validated tests: the Plank Hold Test, Biering–Sorensen Test, and bilateral Side Bridge Tests. Statistical analysis utilized paired t-tests for within-group comparisons, independent samples t-tests for between-group comparisons, and two-way mixed ANOVA for gender subgroup analyses, conducted using SPSS v25.0.

Results: Both groups showed significant improvements in trunk endurance measures ($p < 0.001$) with large effect sizes (Cohen's $d > 1.0$). The isometric group had greater gains in anterior (Plank: 76.4 ± 14.2 vs. 68.3 ± 13.6 s; $p = 0.019$; $d = 0.58$) and posterior endurance (Biering–Sorensen: 108.6 ± 17.8 vs. 96.8 ± 16.4 s; $p = 0.006$; $d = 0.69$). No significant between-group differences were found in lateral endurance ($p > 0.05$). Males outperformed females across all tests, while BMI had a small negative correlation with endurance ($r = -0.29$ to -0.34; $p < 0.05$).

Conclusion: Isometric and isotonic core exercises improved trunk endurance in asymptomatic college students, with isometric training showing superior benefits for anterior and posterior endurance. This supports its use in endurance-focused physiotherapy protocols, offering evidence for core training prescriptions in healthy young adults.

Keywords- Isometric exercise; Isotonic exercise; Trunk endurance; Core stability; Biering–Sorensen Test; Plank Hold Test; Side Bridge Test; Physiotherapy; College students; Quasi-experimental study

TABLE OF CONTENTS

SL NO.	TOPIC	PAGE NO.
1	Certificate	i
2	Declaration	viii
3	Approval Sheet	iii
4	Dedication	iv
5	Acknowledgement	v - vi
6	Abstract	vii
7	Table of Contents	viii
8	List of Tables	ix
9	List of Figures	x - xi
10	List of Abbreviations	xii
11	Introduction	1 - 5
12	Review of Literature	6 - 11
13	Aims and Objectives	12 - 13
14	Materials and Methods	14 - 23
15	Statistical Analysis	24 – 25
16	Results	26 – 34
17	Discussion	35 – 38
18	Conclusion	39 – 40
19	Limitations and Recommendations	41 – 42
20	References	43 – 45
21	Annexures – A Annexures – B	46 - 48