Role of Plank Exercise in Improving Core Stability in School Children – A Narrative Review

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Abstract-
BACKGROUND:
School children are at risk for suffering from various musculoskeletal injuries throughout life. Core stability exercise in the form of plank exercise increases core muscle endurance and reduces the chances of injuries that originated from reduced or defective core muscle activation.
PURPOSE OF THE STUDY:
The review aims to find the effect of plank exercise on improving core stability in school children.
METHODOLOGY:
Evidence was collected by various data bases like Google Scholar, PubMed, Medline, PEDro, and ClinicalTrials.gov.
RESULTS
Based on all evidence and reviewing articles, it is found that the Plank exercise can used to improve core stability in school children.
CONCLUSION:
Plank exercise improves core muscle stability in school children.

Keywords: **Plank exercise, Plank, Children, Core stability, Core Endurance.**

INTRODUCTION:

School children are at risk for suffering from various musculoskeletal injuries throughout life. Core stability exercise in the form of plank exercise increases core muscle endurance and reduces the chances of injuries that originated from reduced or defective core muscle activation. The plank, often referred to as the front hold, modified bridging exercise, or abdominal bridge, is an isometric exercise that works the core by having the participant hold a push-up-like position for as long as they can. Several plank exercises are performed like Plank (on your elbows while prone), side plank, and quadruped opposite your arm or leg (on all fours.)

METHODOLOGY:

Evidences was collected from an extensive electronic search through search engines of MEDLINE/ PubMed, Google Scholar, and Science Direct Using **KEY WORDS** Plank exercise, Plank, Children, Core stability, and Core Endurance. Articles with a full text published in English between **2010-2023** were screened and only relevant articles were included. The search was restricted to studies that were not relevant to the aim, studies that were performed other than school children, reviews, and duplicate articles.

RESULTS:

A total of 18145 records were identified through search engines out of which, 17, 753 records were not screened as they were found to be irrelevant from titles and abstracts. So, 11 articles were included as per the aim of the present review. PRISMA flow diagram of the search procedure for this narrative review is shown in **Fig. 1**.

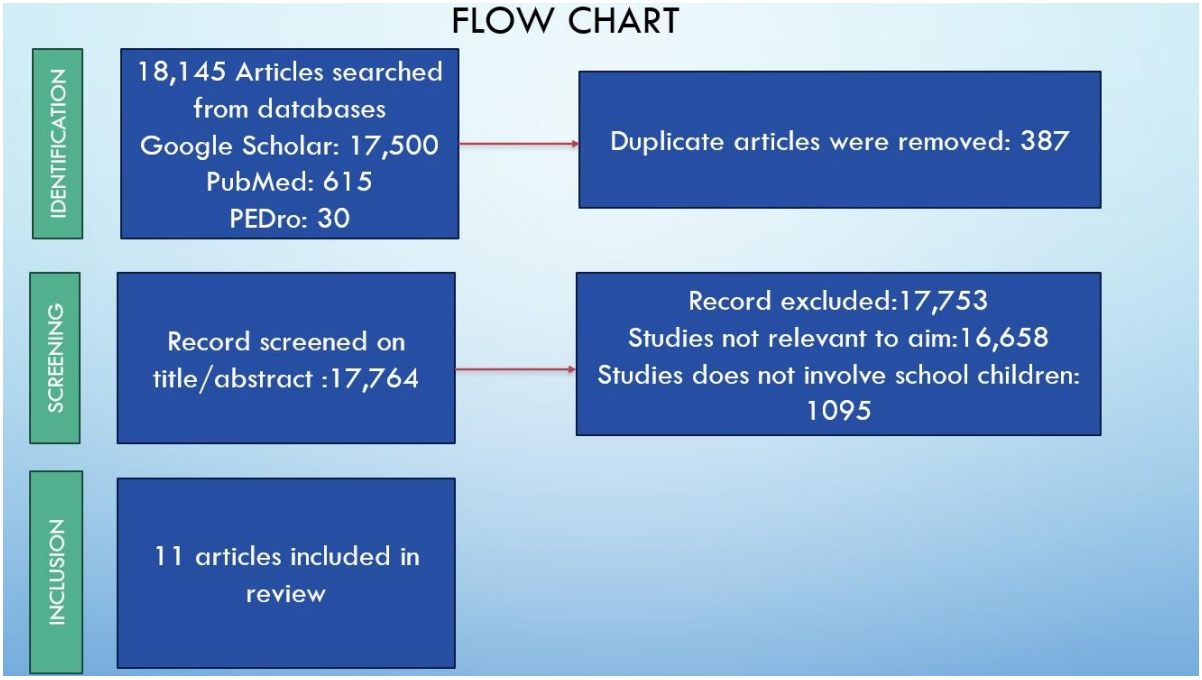

FIG. 1: PRISMA FLOW CHART OF SEARCH PROCEDURE FOR NARRATIVE REVIEW

Details of the 11 articles included in the final analysis are shown in Table 1.

Table 1 Summary of Reviewing Articles

SR.NO	AUTHOR'S NAME	STUDY GROUP	INTERVENTION	CONCLUSION
1	**Gretchen D. Oliver et.al (2010) PEDro Score: 4/10**	n = 182 87-G 95-B 5-12 years	4 different isometric positions for 30 seconds each for **10 months.** Outcome measure: **One-minute sit-up test**	Core stability exercise increases abdominal endurance.
2	**BRETT A. ALLEN et.al (2014) PEDro Score: 8/10**	164 students (86 girls, 78 boys; mean age, 11.5 6 2.5 years)	10 different core exercises were performed including plank. 5 outcome measures: **Parallel Roman Chair Dynamic Back Extension, Prone Plank, Lateral Plank, Dynamic Curl-Up, and Static Curl-up** Duration: **6 weeks**	Moderate-to-high intensity core plank exercises during physical education warm-ups used to improve trunk and core muscular endurance
3	**Nai-Jen Chang et.al (2014) PEDro Score: 8/10**	52 healthy, school-aged children (aged 10–11 years)	A total of 12 movements Each movement was performed for 30 s with a 10-s rest interval, twice per week for **six consecutive weeks.** Outcome measure: **trunk muscular endurance test (i.e., dynamic curl-up, static curl-up, plank, and lateral plank)**	A six-week DCE program as a warm-up exercise significantly improved trunk muscular endurance.

4	**Mr. DODDA KONDALARAO et.al (2023) PEDro Score: 6/10**	40 school boys, 14 to 16 years	The Plank Exercise was given to the experimental group for 6 days per week for **12 weeks.** Outcome measure: **sit-ups**	The findings confirmed the Plank Exercises were a suitable protocol to bring out the desirable changes in abdominal strength and endurance.
5	**Abdurrahman Boyaci et.al (2018) PEDro Score: 6/10**	n = 48 12-14 years	6 dynamic core movements & 6 static core movements 3 times a week and during **10 weeks.** Outcome measure: **Plank test**	Static or dynamic movements can be preferred in core exercise selection.
6.	**Harun Genc et.al (2018) PEDro Score: 6/10**	CTG n=10, age; 12,90±0. 73 year, CG, n=10, age; 12,80±0, 63 year	12 different exercises were performed for **8 weeks**. During the first week of the training program, 10 repetitions and 2 sets for each movement were determined and the of repetitions was increased each week, also the no. of repetitions was increased. Outcome measure: **Leg lifting, plank, isometric back extension endurance, sit-up and push-up tests**	Core exercises performed for 8 weeks positively affect selected endurance and strength.
7.	**MATTHEW D. WRIGHT et.al (2015) PEDro Score: 5/10**	n =22 aged 13.4 6 0.9, range 11.8 to 15.2 years	9 exercises using body weight or resistance bands. Duration: 6 weeks Outcome measure: prone plank and side plank	Increase endurance in the interventional group.
8.	**Abdurrahman Boyaci et.al (2017) PEDro Score: 5/10**	IC n=20, age=13.1 7±0.86yr CG n=20 age=13.0 3±0.50yr	10 exercises for 12 weeks. Outcome measure: Plank test	An applied program can be suggested for the age group of 12-14 to develop the physical performance.
9	**Dr. Chandan Kumar et.al (2015) PEDro Score: 8/10**	n = 70 12-16 years B+G	4 different isometric positions for 30 seconds each for 12 weeks. Outcome measure: One-minute sit-up test	A core stability program can help improve the core strength.
10.	**Miftachul Amiruddin et.al (2023) PEDro Score: 6/10**	32 children	The fourth group was used as a control group (variable control), and the other 3 groups were given different exercises including Elbow Plank, High Plank, and Elbow Plank with Legs Open. Outcome measure: sit-up test (30 s) Duration: 6 weeks	The plank core stability variation training method has a more significant effect on increasing abdominal muscle strength.

DISCUSSION:

The purpose of this review was to determine if a Plank exercise increase could increase core muscular endurance or stability. Core stability is defined as the ability to use muscular strength and endurance to control the spine over the pelvis and leg when performing functional and athletic activities.

According to Ozmen et al., six weeks was found. Balance and core endurance have been substantially improved in the core strength training program, as described below: However, a limitation of their study was that only adolescent badminton players were recruited.

Allen and the others have integrated it. Six weeks of core stability program in the physical education classes of school children, average age of 11 years), which was effective in improving trunk and core muscular endurance. Oliver and his team have put in place fundamental stability.

The intervention has been shown to improve core strength and endurance during a 10-month program in the Primary Physical Education Programme,21 However, the study was limited by the need for a long training period to develop effects.

11 articles suggested that plank exercise increases core stability by activating rectus abdominis, internal oblique and external oblique muscles, and transverse abdominis muscle.

CONCLUSION:

Based on all supporting evidences which were reviewed from databases, it can be concluded that Plank Exercise is an effective form of exercise to improve core stability in the form of core endurance and strength in school children.

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Conflict of Interest: None

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Ethical Approval: Not Applicable

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