

The Effect of Neuromuscular Training on Balance, Power and Movement



Competency in Adolescent Female Netballers

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Introduction

Research has indicated that the use of Neuromuscular Training Programmes (NMT) can improve netball performance (Hopper, et al., 2017). The implementation of this type of programme is likely to increase strength, power and stability of an athlete, which may improve vertical jump height, balance and movement competency, ultimately reducing the risk of sporting injuries.

Due to limited information being available for youth female netballers we were interested in the effects a 6-week NMT programme would have on athletic function in adolescent female netball athletes.

Neuromuscular Training Programme

Block 1-3 EXP Group - Neuromuscular Training Programme.

Exercise	Sets	Reps	Rest (s)
Plyometric Training			
1/2 squat	3	5	30
Lateral bound with stick	3	5	30
SL push off (bench)	3	5	30
90° spin jump	3	5	30
Resistance Training - Session A.			
Back squat	3	5	45
MB static lunge (bent arms)	3	5	45
SB military press	3	5	45
Horizontal pull up (knees bent)	3	5	45
Resistance Training - Session B.			
Front squat	3	5	45
MB static lunge (straight arms)	3	5	45
SB shoulder press	3	5	45
Horizontal pull up (legs straight)	3	8	45

Block 4-6 EXP Group - Neuromuscular Training Programme.

Exercise	Sets	Reps	Rest (s)
Plyometric Training			
1/2 MB squat jump	3	5	30
MB lateral bound	3	5	30
SL push off (bench)	3	5	30
180° spin jump	3	5	30
Resistance Training - Session A.			
Back squat	3	8	45
Incline bench press (DB)	3	8	45
Split squat - BFE	3	8	45
Chin up*	3	8	45
Fwd alternating lunge	3	8	45
Romanian deadlift	3	8	45
Resistance Training - Session B.			
Front squat	3	8	45
Bench press (DB)	3	8	45
Split squat - FFE	3	8	45
Bent-over row	3	8	45
Bwd alternating lunge	3	8	45
Romanian deadlift	3	8	45

SL: Single leg MB: Medicine ball
 SB: Swiss ball DB: Dumbbell
 BFE: Back foot elevated
 FFE: Front foot elevated *Resistance band added

Methods

Participants: Fourteen experienced female netballers volunteered to participate in this study. All participants were free from injury. Consent was received by parents/guardians before the study began.

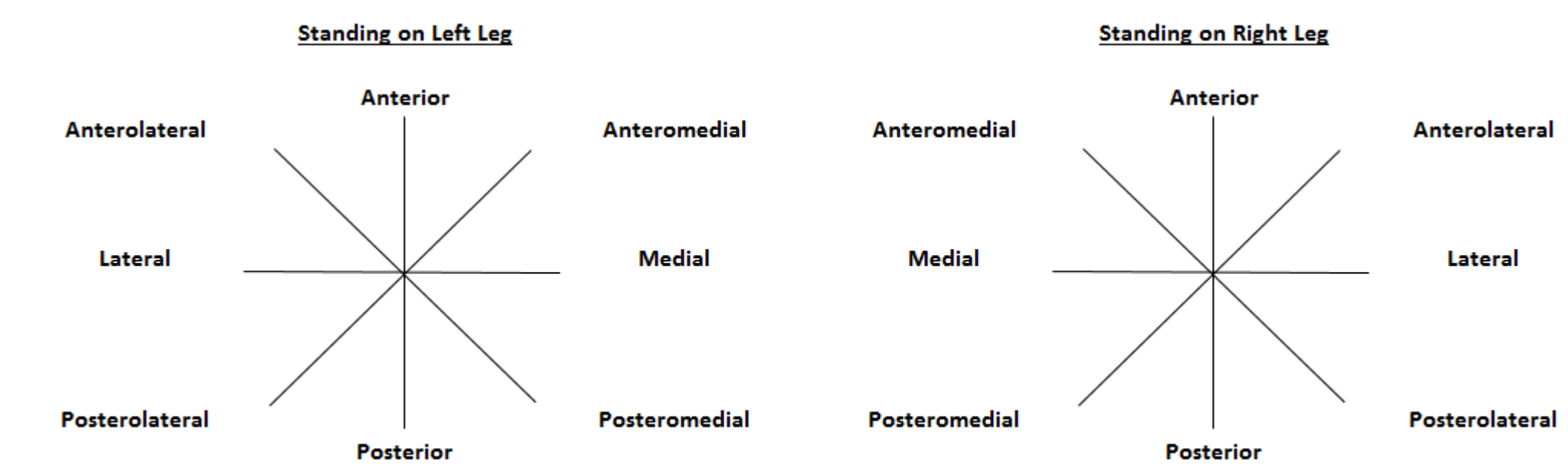
Testing Protocols

Anthropometry: Weight, standing height and seated height were measured.

Table 1. Baseline anthropometrical characteristics (Mean ± SD)

Group	Height	Weight	Age	PHV
Training	168.8 ± 4.3	63.4 ± 6.1	15 ± 0.2	12.3 ± 0.3
Control	169.6 ± 5.0	72.3 ± 13.4	16.6 ± 0.7	12.9 ± 0.5

Star Excursion Balance Test (SEBT): Participants had three trials on each leg. They had to reach as far as they could in each direction, lightly tapping their toes on the measuring tape to indicate maximum distance without losing balance.



Vertical Jump: Three (3) maximal bilateral jumps were performed by each participant. Rest period was considered as the waiting time between each jump. The best two jump scores were used for data analysis.

Movement Competency Screen (MCS): Five (5) movements were analyzed: Squat, lunge & twist, bend & pull, and single leg squat. Each movement was scored out of 3, 1 being they cannot move efficiently and 3 being they move competently and could possibly be loaded.

Training Intervention

The experiment occurred over a 6-week period in both groups. No alterations in training or game schedule were made to the control group (CON). The experimental group (EXP) completed an NMT programme in two weekly one-hour sessions, which were additional to their netball season schedule. Testing occurred pre and post.

Statistical Analysis

Hopkins (2006) spreadsheets of comparative methods were used for the analysis of pre and post trials for each group, as well as comparing groups. This allowed the researcher to obtain change scores, mean nett effects, p values and nett differences for all test protocols used in this study.

Results

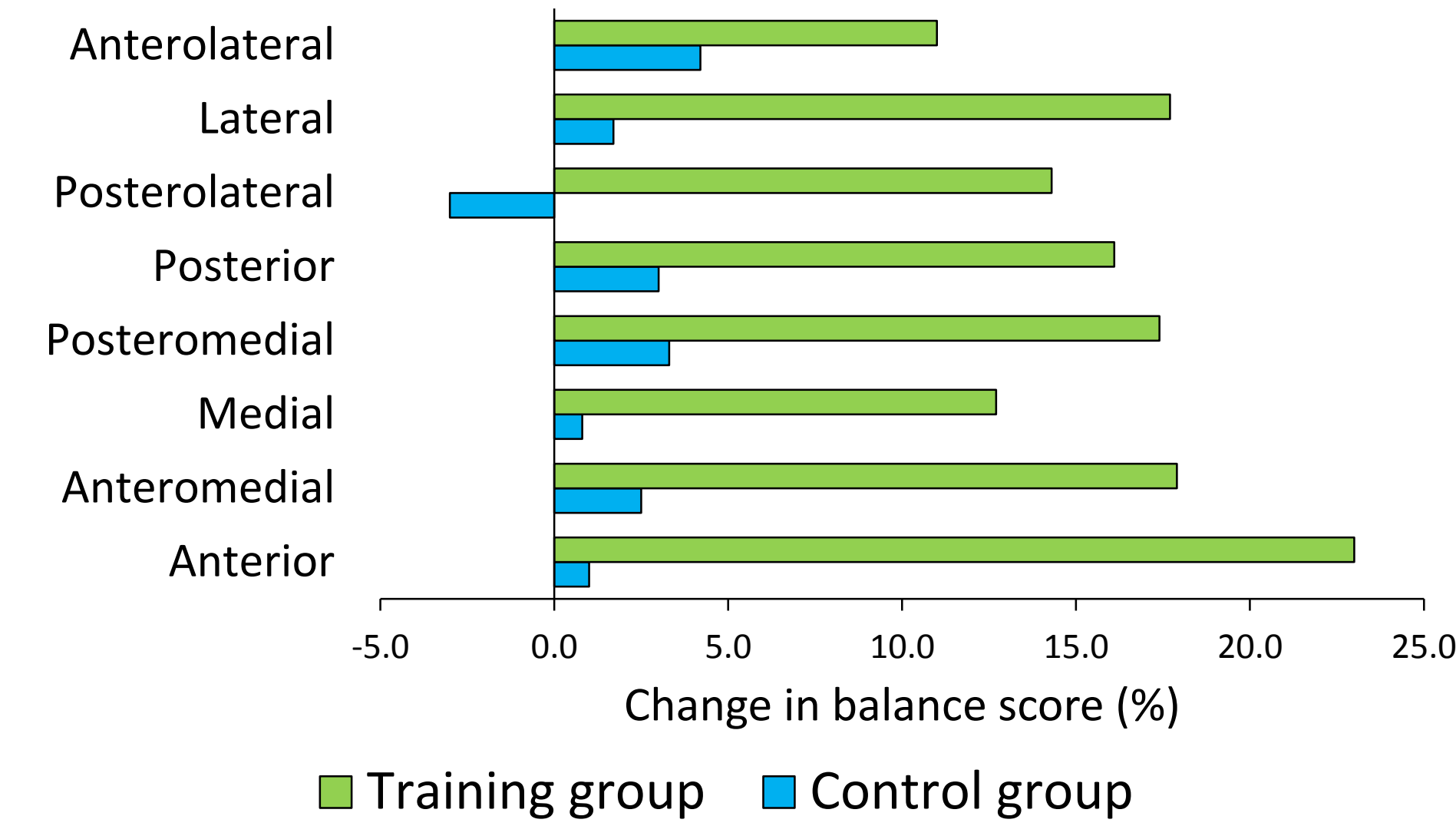


Figure 1: Left leg SEBT showing mean percent change in reach distance for EXP and CON groups pre and post 6-week intervention.

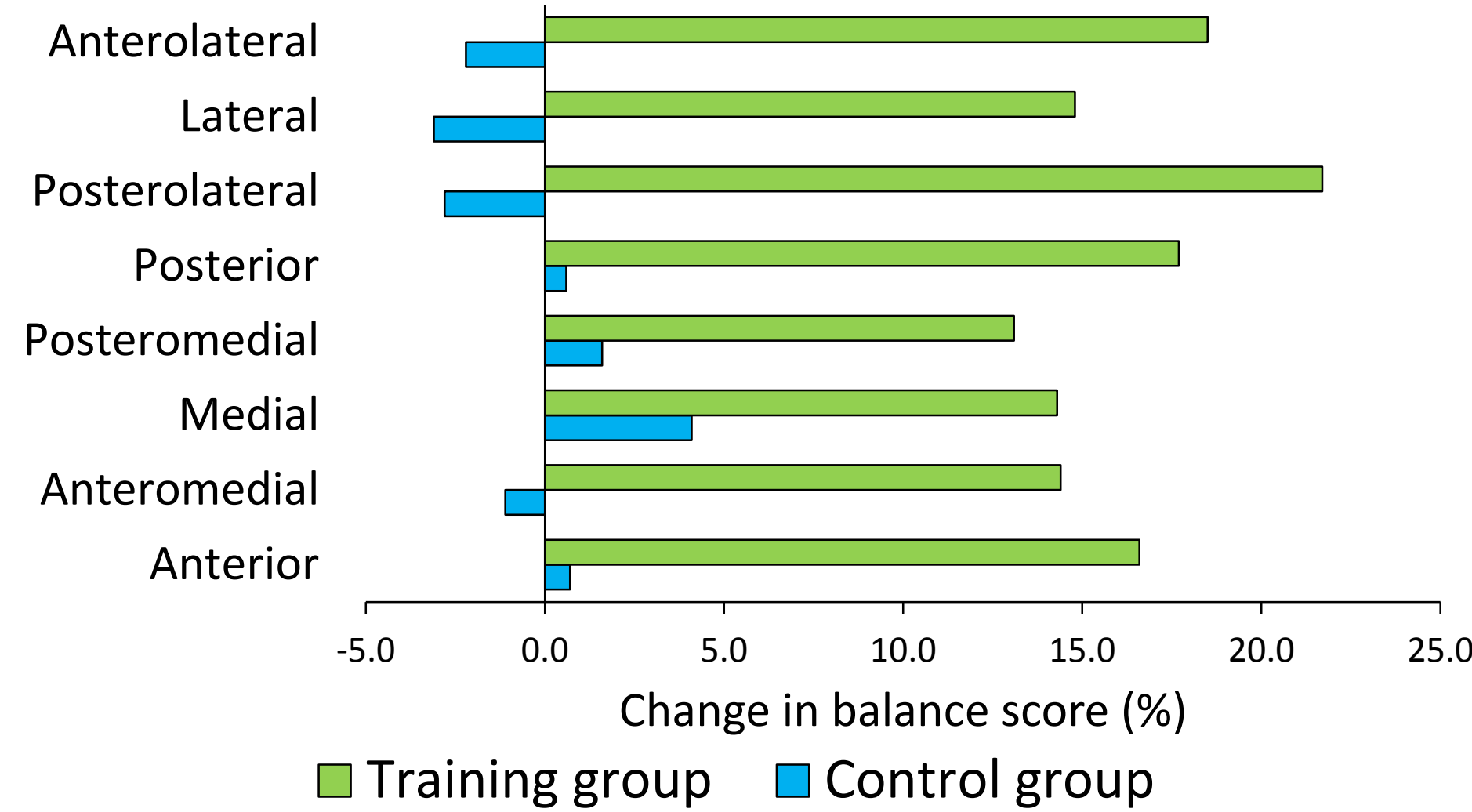


Figure 2: Right leg SEBT showing mean percent change in reach distance for EXP and CON groups pre and post 6-week intervention.

SEBT: There were significant reach distance found in both legs within the EXP. Greater differences were found in the right leg. Improvements were seen in all directions with the exception of posterolateral.

Vertical Jump: Significant differences were seen in the CON results, indicating a 17.7% improvement in jump performance from pre-to post testing. No significant differences were seen in the EXP group. No differences were seen in the data comparing the two.

MCS: The EXP did not significantly improve, however, effect size indicated improvements in all but left single leg squat and lunge & twist. The CON had significantly large reductions in performance, particularly in squat, lunge & twist, bend & pull and push up. When comparing the two groups, large to very large differences were seen for all aspects except for left single leg squat.

Findings

The implementation of a 6-week NMT programme can significantly improve balance and maintain movement competency in 14 to 17 year old female netballers which is consistent with current literature (Hopper, et al., 2017). The training intervention significantly improved the EXP SEBT reach scores, while no improvements were seen in the CON group which is also in agreement with current literature (Hopper, et al., 2017).

The vertical jump findings in this study are in contrast to that of the current literature. Though there is no scientific evidence, a subjective reason for this would be irregular netball trainings and games during the intervention within the EXP.

Although no significant improvement, the EXP's responses have shown that NMT as well as netball trainings can maintain movement competency, as well as have great increases in balance when compared to the CON group.

Recommendations

It is recommended to educate coaches and parents of NMT and the benefits it can provide for now and the future.

Although results from this study showed NMT did improve some aspects of performance, it would be more reliable if conducted on a larger group of athletes.

Future research should look into the validity and reliability of these testing measures on netballers.

References

- Hopkins, W.G. (2006). SportsScience, 10. Available at: sportssci.org/2006/wghcontrial.htm
- Hopper, A., et al., (2017). Neuromuscular training improves movement competency and physical performance measures in 11-13year old netball athletes. *J Strength Cond Res*, 31(5),1165-76.

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