EFFECT OF SHOULDER VERSUS FOREARM EXTENSORS KINESIOTAPE ON HAND GRIP STRENGTH IN NORMAL SUBJECTS

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Introduction

- The human hand is the most important and complex structure of the upper extremity due to its extensive mobility and sensitive capabilities of its surrounding tissues and one of its essential function is gripping.
- The functional movements of the hand are affected by the proximal part of the upper extremity, and injury to the proximal part of the upper extremity can result in hand dysfunction, without any injury of the distal part of the upper extremity.
- The relationship between hand grip strength and isokinetic work of the shoulder stabilizers can be partly explained based upon the mechanisms by which an efficient action of the muscles which act on a distal joint can be performed only when the proximal joint or joints are also efficiently stabilized by the surrounding musculature.

- Kinesiotaping is a novel and effective therapeutic technique believed to facilitate muscle contraction through stimulating mechanoreceptors and increasing the sensory feedback around the taped region. KT and its strength enhancing properties have been the focus of attention in recent studies in view of neuromuscular facilitatory theory.

- This present study was designed to investigate the efficacy of shoulder versus forearm extensor kinesiotaping on hand grip strength in normal subjects, and to determine the peak time of the short term effect of shoulder versus forearm extensor on hand grip strength in 2 hours after taping.

Material and Methods

- **Subjects:** The study was conducted on forty five normal subjects from both genders, aged between 18-30 years. They were selected from the students and workers of the faculty of Physical Therapy, Cairo University. The subjects were randomly subdivided into two groups; Group (A) received kinesio taping on the shoulder (supraspinatus and infraspinatus) muscles and consisted of 24 participants (12 females and 12 males) with mean age, height, body mass, and BMI values of 23.37±3.22 years, 168.95±8.68 cm, 64.08±7.24 kg, and 22.41±1.84 kg/m2 respectively. Group (B) received kinesio taping on the forearm extensors muscles and consisted of 21 participants (11 females and 10 males) with mean age, height, body mass, and BMI values of 23.61±3.33 years, 167.57±8.81 cm, 64.52±9.13 kg, and 22.84±1.65 kg/m2 respectively.

- **Outcome measures:** Maximal grip strength was measured using a JAMAR dynamometer (Sammons Preston, IL, USA). It was used to measure hand grip strength for each participant pre and (immediately, 30, 60 and 120 minutes) after kinesio taping for both groups.

- **Procedure:** Standard 2-in (5 cm) blue Kinesio Tex Gold Tape (Kinesio Holding Company, Albuquerque, NM) was used for all participants in both groups. The general application guidelines for kinesiotaping were followed as suggested by Kenso Kase, 2003

Material and Methods

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- The skin of the shoulder and forearm extensors regions was cleaned with a cotton pad and 70% alcohol to reduce skin resistance before kinesiotape application. For better adherence of the forearm Kinesio tape, all participants in the second group were asked to shave their dominant forearm..

- I-Shaped kinesiotape strips were used for every tape application to standardize the taping protocol.

- Prior to the application the length of the tape was determined and to ensure uniform kinesiotape stretching (50%) among all subjects of both groups, the distance from the origin and insertion of (supraspinatus, infraspinatus and forearm extensors) was measured and multiplied by 0.83, the obtained value was considered as the length of the required kinesiotape. The tape was applied from origin to insertion to facilitate muscle contraction in both groups.

- The subjects were randomly divided on two groups; Group (A):I-Shaped Kinesio tape strips were applied for both supraspinatus and infraspinatus muscle from the origin to insertion to facilitate muscle contraction. Group (B):I-shaped tape (a single strip) was applied for the forearm extensors from the origin to insertion to facilitate muscle contraction.

- Rounding the corner of the tape strips prior to the application and first and last 2 cm of the length of the tape were applied directly over the origin and insertion of the muscles respectively.

Results

- Descriptive statistics in the form of mean and standard deviation for subject characteristics were used.

- 2×5 mixed design ANOVA was used to compare the hand grip strength at different tested periods before and (immediately, 30 minutes, 60 minutes and 120 minutes) after Kinesio tape application of the two groups.

- The level of statistical significance was set at $P<0.05$.

- The obtained results revealed that there was significant difference in the mean value of hand grip strength among different conditions in both groups ($P=0.0001$), but there was no significant difference between both groups ($P>0.05$). The best time interval in group (A) was at 30 minutes while the best time interval in group (B) was at 60 minutes.
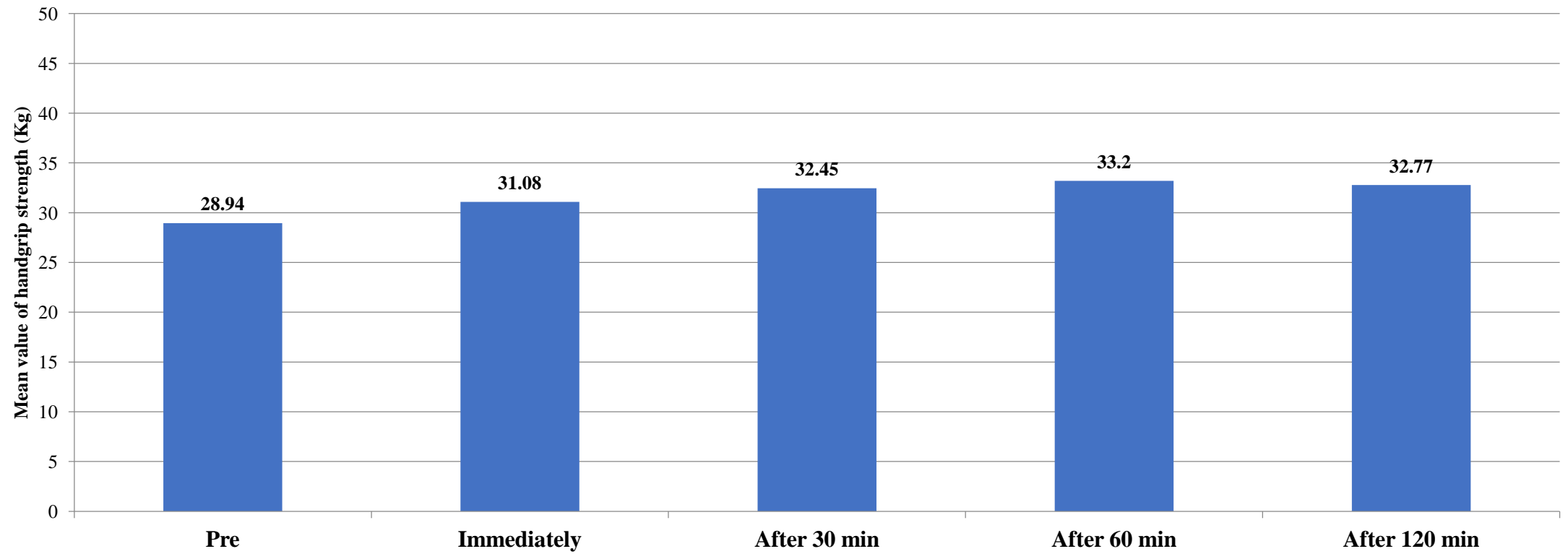
Group A
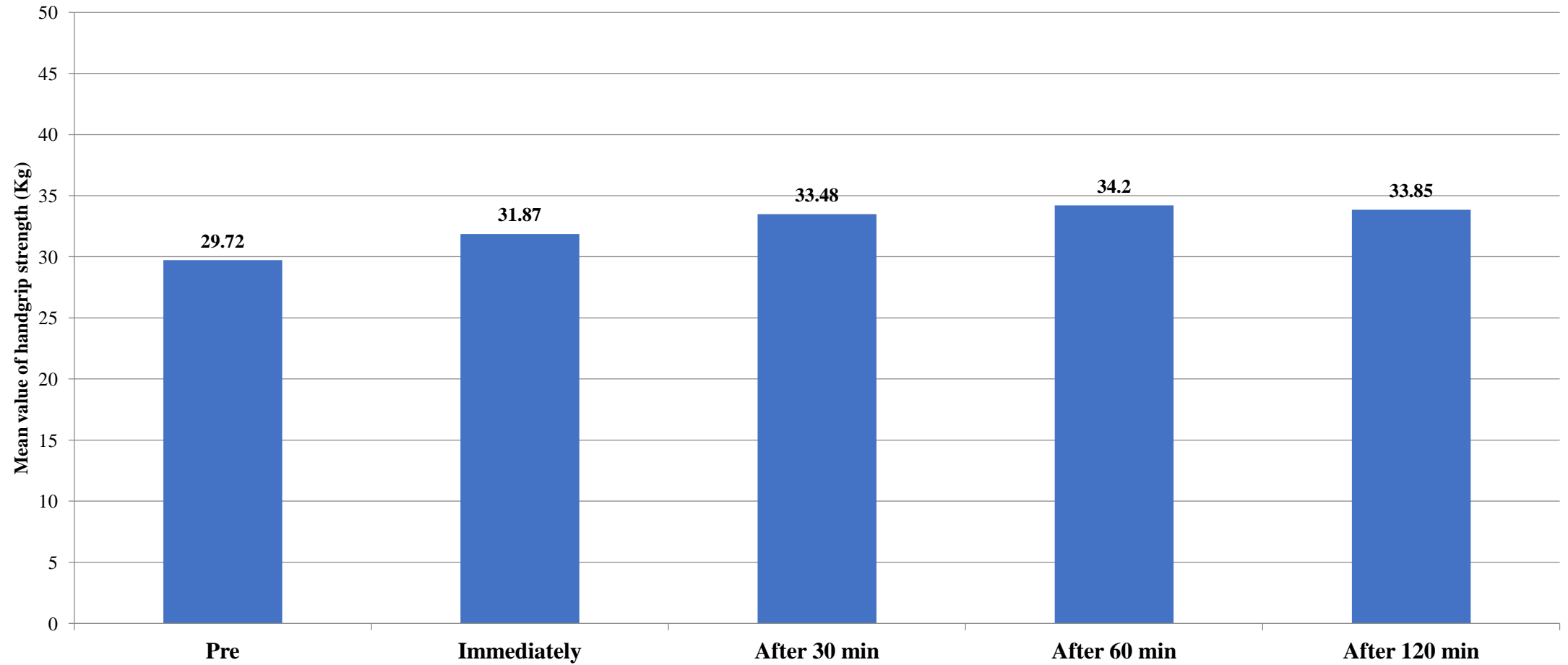
Multiple pairwise comparison tests (Post hoc tests) for handgrip strength for the measuring periods at both groups

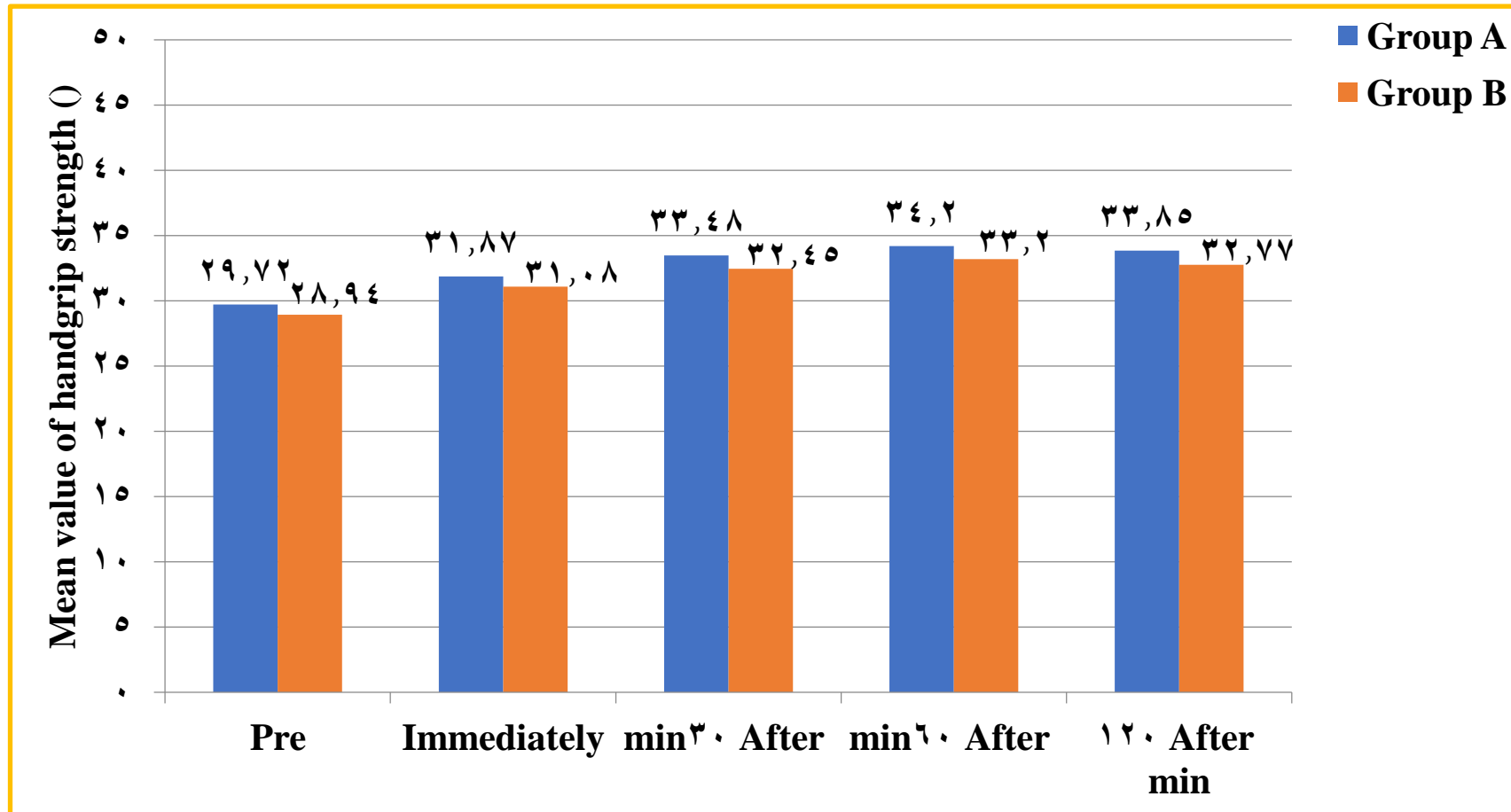| Multiple pairwise comparison tests (Post hoc tests) for handgrip strength for the measuring periods at both groups										
	Pre Vs. Immediately	Pre Vs. After 30 min	Pre Vs. After 60 min	Pre Vs. After 120 min	Immediately Vs. After 30 min	Immediately Vs. After 60 min	Immediately Vs. After 120 min	After 30 min Vs. After 60 min	After 30 min Vs. After 120 min	After 60 min Vs. After 120 min
Group A	0.0001*	0.0001*	0.0001*	0.0001*	0.006*	0.0001*	0.004*	0.10	0.52	0.34

*Significant at alpha level <0.05.

Multiple pairwise comparison tests (Post hoc tests) for handgrip strength for the measuring periods at both groups

	Pre Vs. Immediately	Pre Vs. After 30 min	Pre Vs. After 60 min	Pre Vs. After 120 min	Immediately Vs. After 30 min	Immediately Vs. After 60 min	Immediately Vs. After 120 min	After 30 min Vs. After 60 min	After 30 min Vs. After 120 min	After 60 min Vs. After 120 min
Group B	0.0001*	0.0001*	0.0001*	0.0001*	0.053	0.001*	0.037*	0.11	0.60	0.28

Between groups:

Between groups:

Multiple pairwise comparison tests (Post hoc tests) for handgrip strength between both groups at different measuring periods

	Pre	Immediately	After 30 min	After 60 min	After 120 min
Group A Vs. group B	0.835 (NS)	0.832 (NS)	0.787 (NS)	0.791 (NS)	0.769 (NS)

Significant at alpha level <0.05

Conclusion

- From the finding of the current study, it was concluded that there was no difference between shoulder and forearm extensor kinesiotaping on hand grip strength in normal subjects, and the best time interval was at 30 minutes for the shoulder group and at 60 minutes for the forearm extensors group.