



JOSHUA LIDER, DO¹; MASARU TERAMOTO, PHD, MPH, PSTAT¹; SARAH EBY, MD, PHD¹;
MARC CARAGEA, DO¹; MADISON LASH, BS²; DANIEL M. CUSHMAN, MD¹

¹Division of Physical Medicine and Rehabilitation, University of Utah Health, Salt Lake City, UT
²University of Utah School of Medicine, Salt Lake City, UT

Objective

Ultrasonography is utilized as a diagnostic tool in peripheral nerve disorders. This technique requires normative comparisons of peripheral nerve size (generally reported as a cross-sectional area). Pathologic nerves often have larger or smaller nerve size, depending on the type of injury or disease. The purpose of this systematic review and meta-analysis was to examine the available literature on ultrasonographic peripheral nerve dimensions for normal subjects, excluding the median and ulnar nerves.

Study Design

This systematic review was performed with multiple redundant reviewers analyzing the available literature, pulled from a MEDLINE search, completed June 15, 2020. Ulnar and median nerve dimensions were excluded. Reported nerve cross-sectional areas of healthy participants (often control arms) were recorded. A meta-analysis with a random-effects model was performed to calculate the mean nerve cross-sectional area (= effect size) and its 95% confidence interval (CI), separately for each nerve (at each specific location along the nerve), and for body region (upper vs. lower).

Results

A total of 97 studies with 254 reported data points (mean and standard deviation of different peripheral nerves) were included in the analysis. The results report the mean aggregated cross-sectional area for each peripheral nerve, at each section of the nerve. A minimum of 13, and a maximum of 1254 subjects were aggregated for each nerve location. The peripheral nerves/locations with the greatest numbers of subjects were the radial nerve at the spiral groove (4.437-6.317mm²), common fibular nerve proximal to the fibular head (8.846 - 11.714mm²), and the common fibular nerve at the popliteal fossa (9.119 - 16.679mm²).

Conclusion

This systematic review and meta-analysis of peripheral nerve ultrasound creates new normative dataset for reference purposes. The included nerve cross-sectional areas can be used to identify if a patient falls within the included values. Pathologic peripheral nerve disorders may fall outside of these normative values.

Significance

Ultrasonography is used as a diagnostic tool to evaluate peripheral nerves. With the creation of a normative dataset for healthy peripheral nerves, providers will be able to more accurately identify pathologic nerves under ultrasound examination.

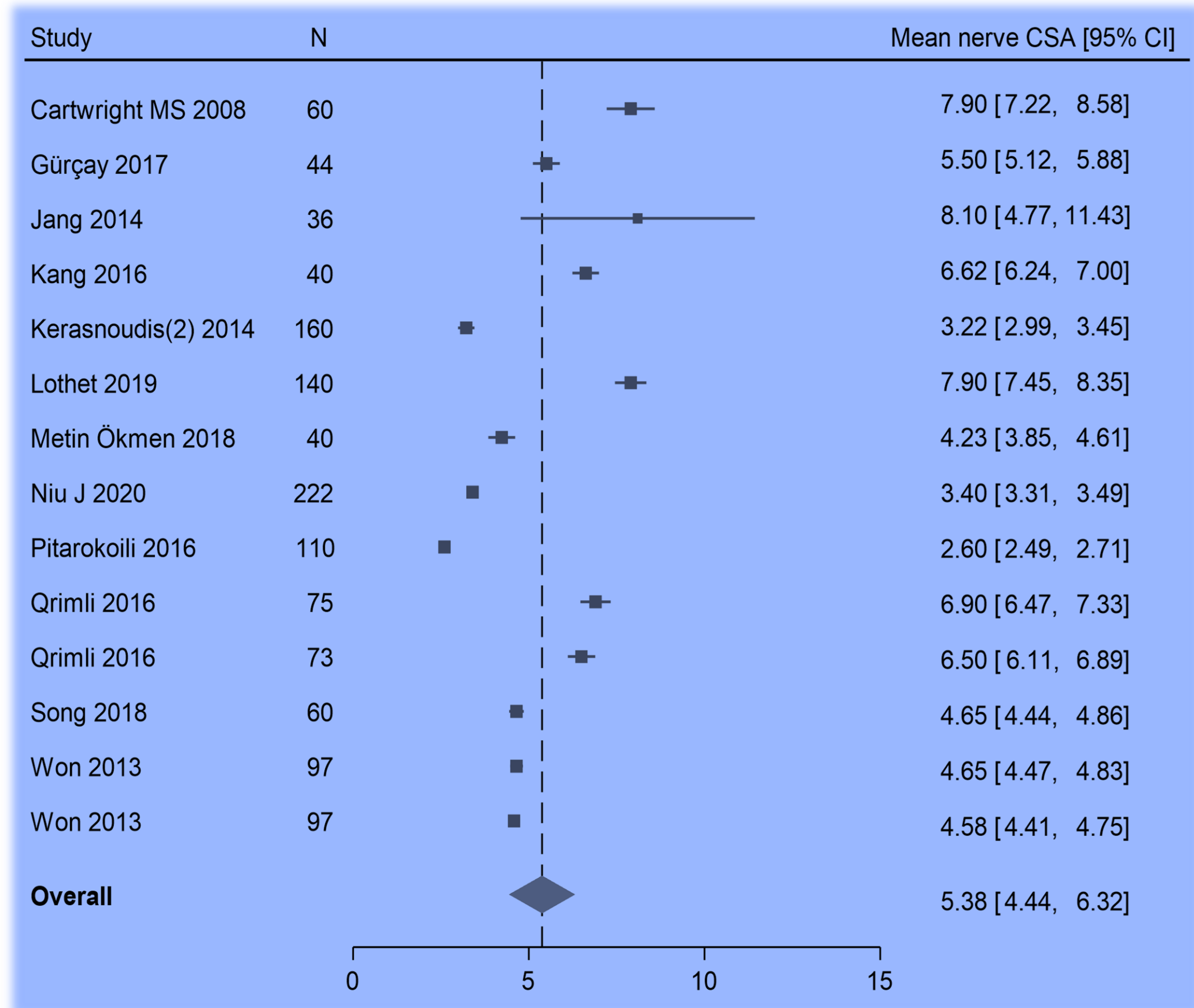


Figure 1a. Forest plot of mean nerve cross-sectional area for radial nerve at the spiral groove
CSA = cross-sectional area, in mm²; CI = confidence interval.

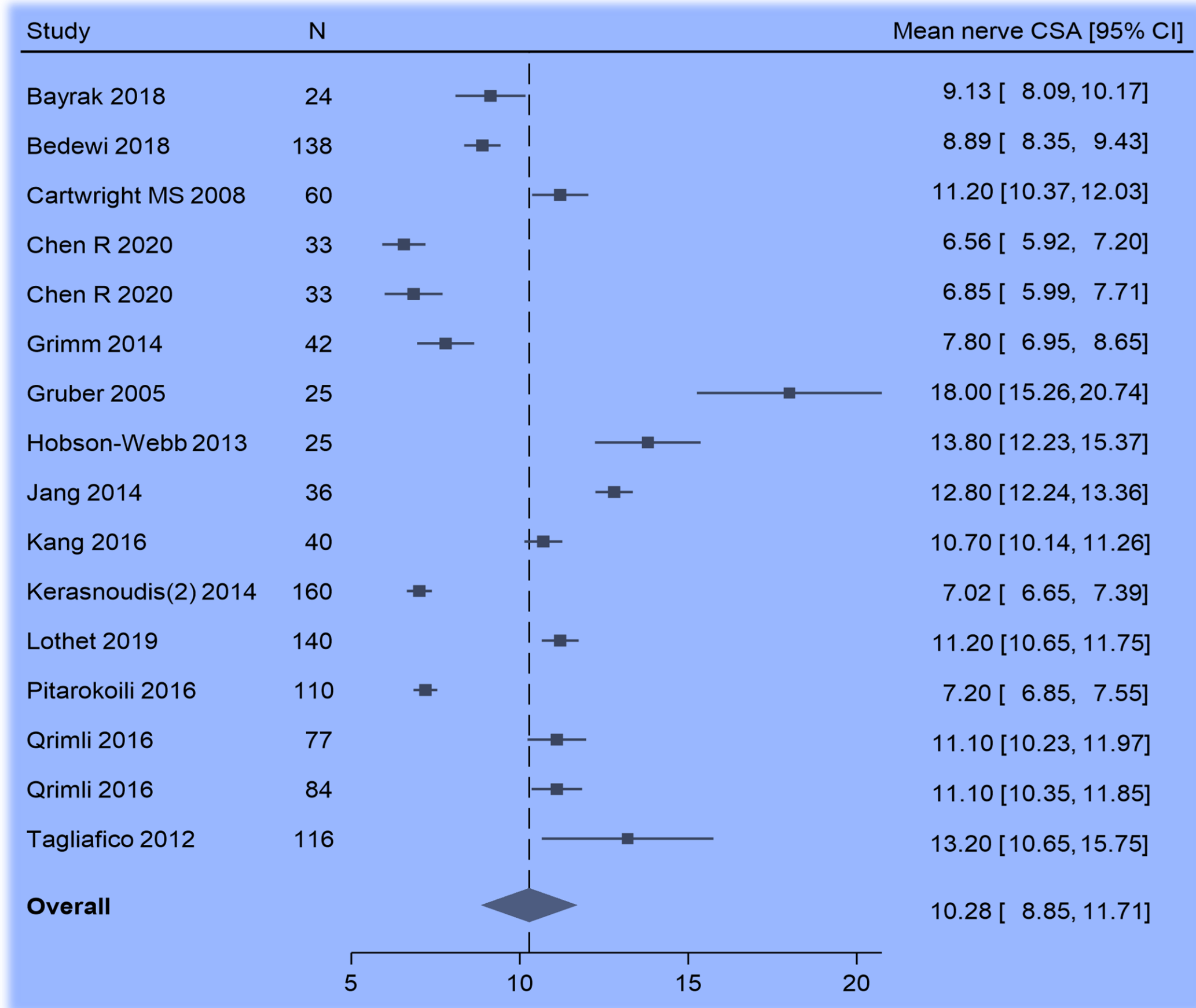


Figure 1b. Forest plot of mean nerve cross-sectional area for common fibular nerve at the fibular head
CSA = cross-sectional area, in mm²; CI = confidence interval.

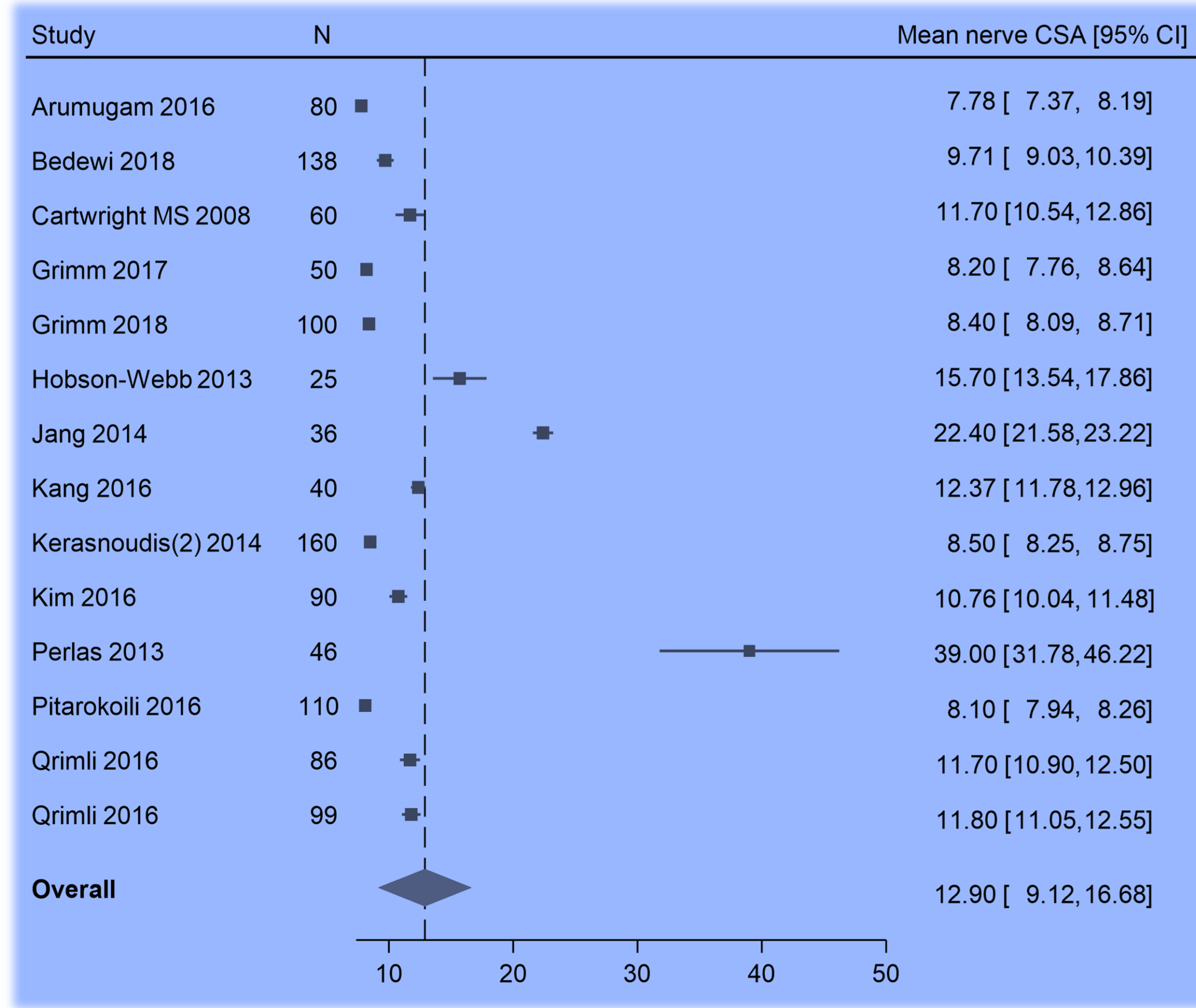


Figure 1c. Forest plot of mean nerve cross-sectional area for common fibular nerve at the popliteal fossa
CSA = cross-sectional area, in mm²; CI = confidence interval.