

## The Common Location and the Intensity of Surface Electrical Stimulation on the Thorax and Abdomen Areas: A Systematic Review

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**Abstract :** Background: Surface electrical stimulation (SES) is a popular non-invasive approach that offers a wide range of treatments for many diseases of physical therapy. It involves applying electrical stimulation to the skin via surface electrodes to stimulate nerve fibers. SES was regularly used to treat the back and upper or lower extremities, but it was rarely used to treat the chest and abdomen. SES on the thorax and abdomen should be administered with more attention because crucial organs are under those areas (i.e., heart, lungs, liver, etc.). In these areas, safety precautions are suggested, and some SES applications might even be a contraindication. The fact that physical therapists have less experience with SES in these situations can also be attributed to these. Although a few earlier studies applied it to these settings and discovered hopeful results, none of them highlight the relationship between the intensity of SES and its depth of impact for safety considerations. Objective: To assure feasibility when using SES in these areas, the purpose of this study is to summarize the common location and intensity of those areas that have been conducted in previous studies. Method: A thorough systematic review was conducted to determine the common surface electrode position for the thorax and abdomen areas. The studies with the randomized controlled design were systematically searched using inclusion and exclusion criteria through nine electronic databases, including Pubmed, Scopus, etc., between 1975 and Dec 2021. Results: Thirty-three studies with over 1800 participants and 4 types of SES (TENS, IFC, NMES, and FES) with various categories of department hospitals were found. Following an anterior, lateral, and posterior observation, the particular SES positions found that it concentrated on 6 regions (the thoracic, abdomen, upper lateral, lower lateral, upper back, and lower back regions), and its intensity for each region was also summarized. Conclusion: This systematic review figured out the popular locations of SES in the thorax and abdominal areas as well as a summarized maximum of intensity that was found in previous studies with outstanding outcomes.

**Keywords :** surface electrical stimulation, electrical stimulation, thoracic, abdomen, abdominal.

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