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Posture Analysis Software for Upper Cross Syndrome: A Review

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ABSTRACT

Upper Cross Syndrome (UCS) is a postural dysfunction characterised by muscle imbalances, including tightness in the upper trapezius, sternocleidomastoid, levator scapulae, and pectoralis muscles, along with weakness in the deep neck flexors, serratus anterior, lower trapezius, and rhomboid muscles. These imbalances result in postural abnormalities such as rounded shoulders, forward head posture, thoracic hyperkyphosis, and scapular internal rotation, abduction, and winging, commonly assessed visually. Postural analysis software, including Kinovea, AutoCAD, Biotonix, and Adobe Photoshop, is increasingly used for more precise evaluations. However, no dedicated studies have investigated the effectiveness of these tools in UCS assessment, creating a gap in research. This study reviewed the literature on the effectiveness of postural analysis software for UCS. A search of PubMed, Ovid, Scopus, Google Scholar, and PEDro identified studies published between 2015 and 2024. Only Randomised Controlled Trials (RCTs) and randomised pilot trials in English-language peer-reviewed journals were included. Of the 30 articles identified, 13 met inclusion criteria. The software reviewed demonstrated varying levels of reliability, validity, and cost. Kinovea, a free motion analysis tool, showed the highest reliability (ICC 0.997) and validity (Intraclass Correlation Coefficient [ICC] 0.998). AutoCAD, another free option, excelled in biomechanical precision (reliability 0.984, validity 0.962). Adobe Photoshop, used for photograph-based assessments, offered high reliability (ICC 0.98–0.99) and validity (0.99–1.0) at $19.99/month. Biotonix, tailored for healthcare applications, demonstrated reliability (ICC>0.95) but required a $79/month subscription. All tools exhibited high reliability and validity, with Kinovea and AutoCAD standing out for cost-effectiveness, while Adobe Photoshop and Biotonix provided advanced features for specialized applications. Kinovea's high reliability and zero cost make it suitable for resource-limited settings, whereas Biotonix's user-friendly interface supports clinical use. The findings highlight the potential of postural analysis software as a complement to traditional UCS assessment methods. Tailoring software choice to clinical or research needs is essential. Further studies are recommended to explore their long-term efficacy and practical application in diverse environments for optimising UCS assessment and management.

Keywords: Assessment, Postural dysfunction, Reliability