



臺北市立萬芳醫院 - 委託臺北醫學大學辦理

Taipei Municipal Wanfang Hospital (Managed by Taipei Medical University)

高能量雷射治療是否能改善頸痛病人的症狀？

報告者：林宜仙 物理治療師

報告日期：114.02.26



大綱

1. 高能量雷射治療簡介
2. PICO
3. Critical appraisal
4. CASP 系統性文獻回顧檢核表

雷射等級分類 (Laser Classifications)

等級	輸出功率範圍	特性與風險	應用範圍
Class 1 (1 級)	極低功率 (通常 $<0.39\mu\text{W}$)	安全，正常使用情況下不會對眼睛或皮膚造成傷害	CD/DVD 播放機、條碼掃描器
Class 1M (1M 級)	低功率，但可能有聚焦風險	對裸眼安全，但透過光學器材 (如望遠鏡) 觀察可能有危險	光纖通信、測距儀
Class 2 (2 級)	$<1\text{mW}$ (可見光範圍 400-700nm)	短暫直視可能無害，眨眼反射能提供保護	雷射指示筆、超市掃描器
Class 2M (2M 級)	$<1\text{mW}$ ，但可能因光學聚焦而有危險	裸眼觀看通常安全，但透過光學設備可能危險	測距儀、雷射對準儀
Class 3R (3R 級)	1mW - 5mW	可能對眼睛造成傷害，但風險較低	強光雷射指示器、簡單科學實驗
Class 3B (3B 級)	5mW - 500mW	直接觀看光束危險，可能導致眼睛或皮膚灼傷	研究雷射、 醫療雷射 、工業雷射
Class 4 (4 級)	$>500\text{mW}$	極度危險，可導致眼睛、皮膚損傷，甚至引燃物體	高能量雷射治療 (HPLT) 、手術雷射、工業切割雷射

低能量雷射

高能量雷射

高能量雷射 (High-Power Laser Therapy, HPLT)

- 非侵入性的治療方法，利用高功率雷射深入組織，以達到止痛、抗炎和促進組織修復的效果。

- 組織對特定波長光的吸收，轉化為熱能，導致局部溫度升高。
- 熱效應可增加組織代謝、促進血液循環、減少炎症，並降低組織的黏滯性。

光熱效應
(Photothermal
Effect)

光化學效應
(Photochemical
Effect)

- 雷射光子被細胞內的線粒體吸收，進而增加三磷酸腺苷 (ATP) 的合成。
- ATP 是細胞的主要能量來源，其增加有助於細胞功能的增強和組織修復。

機
制

- 脈衝能量可在組織中產生機械波 (如應力波)，這些波動可以刺激細胞重組，促進組織的再生和修復。

光機械效應
(Photomechanical
Effect)

神經調節效應
(Neuromodulation
Effect)

- 光生物調節作用，抑制神經傳導，促進β-內啡肽和血清素的釋放，達到鎮痛效果。

高能雷射、傳統低能雷射與震波治療相較

項目	高能雷射 HILT High-Power Laser Therapy	低能雷射 LLLT Low-Level Laser Therapy	震波治療 ESWT Extracorporeal Shock Wave Therapy
治療能量	>500 mW – 60W	<500 mW	0.1 - 100 mJ/mm² (能量密度)
治療深度	5-10 cm (深層組織，如肌肉、關節、韌帶)	<2 cm (淺層組織，如表層肌肉、神經)	5-7 cm (適用於肌腱、骨膜、結締組織)
臨床適用性	<ul style="list-style-type: none"> 適合深層疼痛、運動傷害、神經痛、骨關節炎 快速緩解疼痛，促進深層組織修復 需經專業醫療人員操作，安全防護需求較高 	<ul style="list-style-type: none"> 適合淺層組織修復，如肌肉表層炎症、慢性疼痛 能量低，但仍可促進細胞修復與抗發炎 安全性高，可用於居家或物理治療診所 	<ul style="list-style-type: none"> 適合肌腱炎、足底筋膜炎、網球肘、鈣化性肌腱炎 能夠刺激骨骼和軟組織修復，但治療時可能會有短暫疼痛 可搭配其他療法如 HPLT 或 LLLT 提升療效

Iranian journal of medical sciences. 2024;49(3), 147

Lasers in medical science. 2021;36(4), 773-781.

Journal of Clinical Medicine. 2025; 14(2), 594.

Physiotherapy Quarterly. 2021;29(2), 1-11.

高能雷射治療波長

波長 (nanometer, nm)	治療範圍	適用病症
630–670 nm	表淺組織修復	皮膚傷口、黏膜炎症
808 nm	中等穿透	肌肉、關節炎、神經痛
980 nm	深層治療，熱效應強	肌腱炎、關節炎、神經修復
1064 nm	最深穿透	椎間盤病變、深層肌肉損傷



樂福雷射

- Nd:YAG 是 Neodymium-doped Yttrium Aluminum Garnet (釹摻雜鈦酸鋁石榴石) **釹雅克雷射**
- 原理
 - (1)光泵浦激發:閃光燈 (氙燈) 釹吸收光能
 - (2)受激輻射放大:雷射諧振腔 (兩面反射鏡組成)
 - (3)雷射輸出:輸出耦合鏡 (Partial Reflector) 釋放，形成穩定的 1064 nm 紅外雷射

高能量雷射 (High-Power Laser Therapy)

- 注意事項:
 - 治療時需配戴激光保護眼鏡或護目鏡
 - 不適當使用護目鏡比不使用更危險，因為它們可能會提供錯誤的安全感。
 - 激光設備應放置在受控區域中，以避免無意間接觸。
 - 避免從鏡面的激光反射。
 - 避免眼睛暴露及未關閉閘門。

References

- Bidoki, M. Z., Nasab, M. R. V., & Aghda, A. K. (2024). Comparison of High-intensity Laser Therapy with Extracorporeal Shock Wave Therapy in the Treatment of Patients with Plantar Fasciitis: A Double-blind Randomized Clinical Trial. *Iranian journal of medical sciences*, 49(3), 147.
- Badıl Güloğlu, S. (2021). Comparison of low-level laser treatment and extracorporeal shock wave therapy in subacromial impingement syndrome: a randomized, prospective clinical study. *Lasers in medical science*, 36(4), 773-781.
- Hamblin, M.R. (2017). Mechanisms and applications of the anti-inflammatory effects of photobiomodulation. *AIMS Biophysics*, 4(3), 337-361.
- Huang, Y. Y., Chen, A. C. H., Carroll, J. D., & Hamblin, M. R. (2009). Biphasic dose response in low level light therapy. *Dose-response*, 7(4), dose-response.
- Pasin, T., & Karatekin, B. D. (2025). Comparison of Short-Term Effects of Extracorporeal Shock Wave Therapy, Low-Level Laser Therapy and Pulsed Electromagnetic Field Therapy in Knee Osteoarthritis: A Randomized Controlled Study. *Journal of Clinical Medicine*, 14(2), 594.
- de la Barra Ortiz, H. A., Cangas, S. A., Herrera, A. C., García, F. O., & Velásquez, S. V. (2021). Efficacy of class IV laser in the management of musculoskeletal pain: a systematic review. *Physiotherapy Quarterly*, 29(2), 1-11.

高能量雷射治療是否能改善頸痛病人的症狀

Lasers in Medical Science (2024) 39:124
<https://doi.org/10.1007/s10103-024-04069-0>

REVIEW ARTICLE

A systematic review and meta-analysis of randomized controlled trials on the effectiveness of high-intensity laser therapy in the management of neck pain

Hernán Andrés de la Barra Ortiz^{1,2}  · Mariana Arias²  · Richard Eloin Liebano^{2,3} 

Received: 7 October 2023 / Accepted: 24 April 2024 / Published online: 6 May 2024

© The Author(s), under exclusive licence to Springer-Verlag London Ltd., part of Springer Nature 2024

臨床問題	高能量雷射治療是否能改善頸痛病人的症狀?
問題/研究族群 P roblem/Patient	<ul style="list-style-type: none"> • Neck pain
給予的措施 I ntervention	<ul style="list-style-type: none"> • High-intensity laser therapy
對照組 C omparison	<ul style="list-style-type: none"> • Other physical therapy interventions, with or without the HILT placebo
結果 O utcomes	<ul style="list-style-type: none"> • Pain • CROM • Disability



CRITICAL APPRAISAL

- **Methods**
- **Results**
- **Discussion**



Methods

- Searching was performed using a set of keywords selected from the Medical Subject Headings (MeSH) dictionary.
- Keywords included: "lasers", "laser therapy", "high-intensity Laser Therapy", "Class IV laser", "neck pain", "musculoskeletal pain", "myofascial pain syndromes", "cervical spondylosis" and "whiplash injuries".
- The search covered eight electronic databases, including PubMed, Scopus, Web of Science, CINAHL, Science Direct, Cochrane Library, the Physiotherapy Evidence-Based Database (PEDro), and Google Scholar (updated January 7, 2024).
- The "clinical Trial" and "randomized controlled trial" filters were applied to ensure the inclusion of RCTs in the search.
- methodological quality: PEDro scale & Cochrane Collaboration Risk of Bias (RoB)



Methods

Inclusion criteria

1. human RCTs on neck disorders
2. studies in English, Spanish, or Portuguese
3. treatment with HILT as either the sole intervention or in combination with other therapies
4. comparison with other physical therapy treatments or HILT placebo
5. the main outcome was centered on pain intensity changes

Exclusion criteria

Literature reviews and other systematic review on HILT, neurological or musculoskeletal disorders from another body region, and studies with incomplete or unavailable texts were excluded.

Results

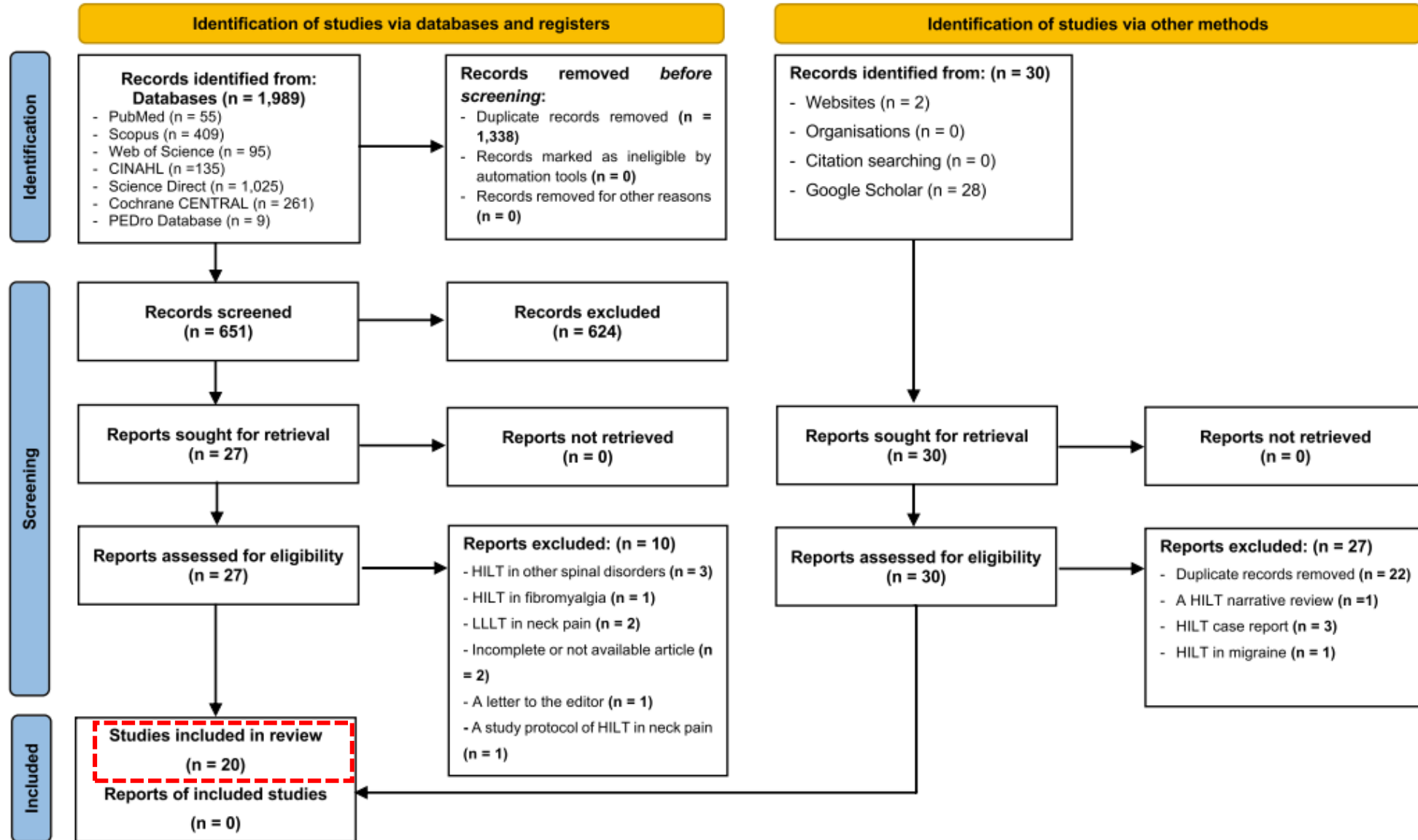


Fig.1 PRISMA flow chart diagram

Table 1 Studies examined using the PEDro scale

PEDro scale criteria													
	AUTHOR YEAR COUNTRY	CRITERIA 1*	CRITERIA 2	CRITERIA 3	CRITERIA 4	CRITERIA 5	CRITERIA 6	CRITERIA 7	CRITERIA 8	CRITERIA 9	CRITERIA 10	CRITERIA 11	TOTAL SCORE
1	Conforti (2013) ¹ [28]	Yes	Yes	No	Yes	No	Yes	Yes	No	No	Yes	Yes	6
2	Dundar (2015)** [15]	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	8
3	Ala1at (2016)** [29]	Yes	Yes	No	Yes	No	No	No	No	No	Yes	Yes	4
4	Alayat(2017)** [30]	No	Yes	No	Yes	Yes	Yes	Yes	No	No	Yes	Yes	7
5	Haladaj (2017) I [31]	Yes	Yes	No	Yes	No	No	No	No	No	Yes	Yes	4
6	Venosa (2019)** [32]	No	Yes	No	Yes	No	No	No	No	No	Yes	Yes	4
7	ilmaz (2020)** [33]	No	Yes	No	Yes	No	No	No	Yes	No	Yes	Yes	5
8	Ahmed (2020) I [34]	Yes	Yes	No	Yes	No	No	No	No	No	Yes	Yes	4
9	Ala1at (2020)**[35]	No	Yes	No	Yes	Yes	Yes	Yes	No	No	Yes	Yes	7
10	ShadI (2020) I [36]	Yes	Yes	No	Yes	No	No	No	Yes	No	Yes	Yes	5
11	Paradnia (2020)I	Yes	No	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Yes	7
12	Kenareh (2021)** [38]	Yes	Yes	Yes	Yes	No	No	Yes	No	No	No	Yes	5
13	Barassi (2021)** [39]	Yes	Yes	Yes	No	No	No	Yes	No	No	Yes	No	4
14	Taleb (2022) I [40]	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	Yes	Yes	8
16	Ashour (2022) I [41]	Yes	Yes	Yes	Yes	No	No	No	Yes	No	Yes	Yes	6
15	Dundar (2023)** [42]	No	Yes	No	Yes	No	No	Yes	Yes	No	Yes	Yes	6
17	Ince (2023)I [43]	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	8
18	Namvar (2023) I [44]	Yes	Yes	No	Yes	No	Yes	Yes	No	No	Yes	Yes	6
19	Ramadan (2023) I [45]	Yes	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	7
20	Sherif (2023) I [46]	Yes	Yes	0	Yes	Yes	No	Yes	No	No	Yes	Yes	6

PEDro scores

≥5: 15(75%)

Table 2 Characteristics of included studies

Author Year Country	Clinical condition	Total (n) Groups (n) Mean age (x ± SD)	Intervention	Sessions	Assessment	Outcomes	Results after treatment	Sources of funding
1 Conforti 2013 Italy	Whiplash	n = 135 EG = 84 (35♂; 49♀) CG = 51 (27♂; 24♀) mean age NS	EG: HILT CG: PT	8 s (4 weeks)	T0: baseline T1: 1 week (post-treatment)	PI (VAS) Time length recovery (days)	EG: ↓PI* and ↓days recovery* CG: ↓PI* and ↓days recovery* EG < CG: ↓PI and ↓days recovery*	Not reported
2 Dundar [15] 2015 Turkey	Myofascial pain	n = 75 EG = 38 (0♂; 38♀) CG = 37 (0♂; 37♀) mean age NS	EG: HILT + TE CG: Sham HILT + TE	15 s (3 weeks)	T0: baseline T1: 4 weeks (post-treatment) T2: 12 weeks (follow-up)	PI (VAS) CROM (GNM) Disability (NDI) QoL (SF-36)	EG: ↓PI*, ↑CROM*, ↓disability* and ↑QoL* CG: ↓PI*, ↑CROM*, ↓disability* and ↑QoL* EG < CG: PI and disability* EG = CG: ↑CROM and ↑QoL	No funding was received for this study
3 Alayat [29] 2016 Saudi Arabia	Chronic neck pain	n = 60 EG = 30 (30♂; 0♀) CG = 30 (30♂; 0♀) 35.5 ± 0.8	EG: HILT + cervical glide MWM + TE CG: Sham HILT + cervical glide MWM + TE	12 s (6 weeks)	T0: baseline T1: 6 weeks (post-treatment)	PI (VAS) CROM (GNM) Disability (NDI)	EG: ↓PI*, ↑CROM*, and ↓disability* CG: ↓PI*, ↑CROM*, and ↓disability* EG < CG: PI* and disability* EG > CG: ↑CROM*	This research was conducted with a grant from the Institute of Scientific Research and Revival of Islamic Heritage at Umm Al-Qura University, Makkah, Saudi Arabia
4 Alayat [30] 2017 Egypt	Chronic neck pain	n = 75 EG = 25 (NS) CG1 = 25 (NS) CG2 = 25 (NS) 45.2 ± 6.1	EG: HILT + TE CG 1: LLLT + TE CG 2: Sham HILT + TE	12 s (6 weeks)	T0: baseline T1: 6 weeks (post-treatment)	PI (VAS) Disability (NDI)	EG: ↓PI* and ↓disability* CG: ↓PI* and ↓disability* EG < CG: ↓PI* and ↓disability*	No funding was received for this study

2~6wks
5~20s
2~5s/wk

Table 3 Characteristics and parameters of the lasers used in the studies

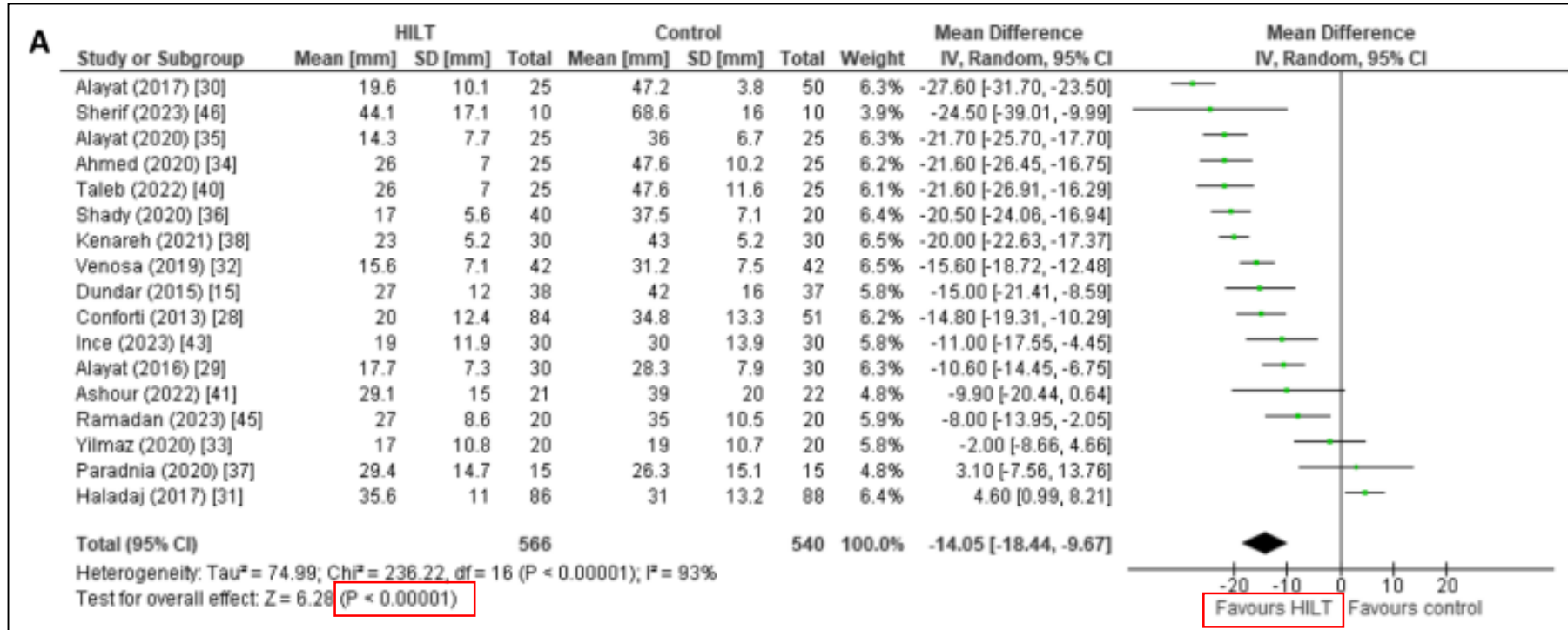
Characteristics/ Parameters	Conforti (2013) [28]	Dundar (2015) [15]	Alayat (2016) [29]	Alayat (2017) [30]	Haladaj (2017) [31]	Venosa (2019) [32]	Yilmaz (2020) [33]	Ahmed (2020) [34]	Alayat (2020) [35]	Shady (2020)[36]
Laser model	HPLT- FP3 System®	HIRO 3.0 (ASA laser, Arcugnano, Italy)	HIRO 3.0 (ASA laser, Arcugnano, Italy)	Mphi laser device (ASA, Arcugnano, Italy)	BTL-6000 HILT 7W	HIRO 3.0 (ASA laser, Arcugnano, Italy)	BTL-6000 HILT	ZIMMER OPTON PRO	HIRO 3.0 (ASA laser, Arcugnano, Italy)	HIRO 3.0 (ASA laser, Arcugnano, Italy)
Wavelength	780 and 1.100 nm (dual)	1,064 nm (Nd:YAG)	1,064 nm (Nd:YAG)	808 nm and 905 nm (Ga-Al-Ar)	980 nm (Nd:YAG)	1,064 nm (Nd:YAG)	1,064 nm (Nd:YAG)	810 nm and 980 nm (dual)	1,064 nm (Nd:YAG)	1,064 nm (Nd:YAG)
Mode (continuous/pulsed)	NS	pulsed	pulsed	808 nm continuous mode 905 nm pulsed mode	continuous	pulsed	pulsed	continuous/pulsed	pulsed	pulsed
Peak power (W)	12.0 Watt ± 10%	3,000 W (3 kW)	3,000 W (3 kW)	1 W (1,000 mW) (continuous mode) 25 W (pulsed mode)	7 W	3,000 W (3 kW)	3,000 W (3 kW)	7 W	3,000 W (3 kW)	3,000 W (3 kW)
Mean power (W)	NS	3 W	3 W	0.5 W (500 mW) (continuous mode) 0.054 W (54 mW) (pulsed mode)	7 W	3 W	3 W	3 W	10.5 W	3 W
Frequency (Hz)	NS	10~40 Hz	10~40 Hz	1,500 Hz	25 Hz	10~40 Hz	10~40 Hz	5 Hz	15 Hz	10~40 Hz
Phase duration (µs)	NS	120–150 µs (0.1% duty cycle)	120–150 µs (0.1% duty cycle)	NS	NS	120–150 µs (0.1% duty cycle)	120–150 µs (0.1% duty cycle)	µs NS (50% duty cycle)	100 µs (0.1% duty cycle)	120–150 µs (0.1% duty cycle)
Spot size (cm ² or diameter)	NS	0.2 cm ²	0.2 cm ²	3.14 cm ²	NS	0.2 cm ²	0.2 cm ²	10 mm	0.2 cm ²	0.2 cm ²
Treatment technique	Point application	Phase 1: scanning technique Phase 2: point application Phase 3: scanning technique	Phase 1: scanning technique Phase 2: point application Phase 3: scanning technique	Phase 1: scanning Phase 2: point application	Point application	Phase 1: scanning technique Phase 2: point application Phase 3: scanning technique	Scanning technique	Point application	Point application for 4 phases	Scanning technique
Power density	6.5 W/cm ² ± 10%	15 W/cm ²	15 W/cm ²	NS	0.3 W/cm ²	15 W/cm ²	NS	NS	NS	15 W/cm ²
Energy density (J/cm ²)	20–30 J/per point	NS	27.3 J/cm ²	4 J/cm ²	50 J/cm ²	NS	5 J/cm ²	6.4 J/cm ²	Phase 1: 0.51 J/cm ² Phase 2: 0.61 J/cm ² Phase 3: 0.71 J/cm ² Phase 4: 0.81 J/cm ²	NS
Total energy (J)	120–180 J	Phase 1: 500 J Phase 2: 60 J (10 J/point) Phase 3: 500 J Total = 1,060 J	Phase 1: 1,025 J Phase 2: 200 J (25 J/point) Phase 3: 1,025 J Total = 2,250 J	Phase 1: 300 J Phase 2: (25 J/point) Total = 2,250 J	1,250 J	Phase 1: 1,000 J Phase 2: 200 J (25 J/point) Phase 3: 800 J Total = 2,000 J	1,850 J	NS	Phase 1: 10 J Phase 2: 12,5 J Phase 3: 12,5 J Phase 4: 15 J	NS

1064, 808~980

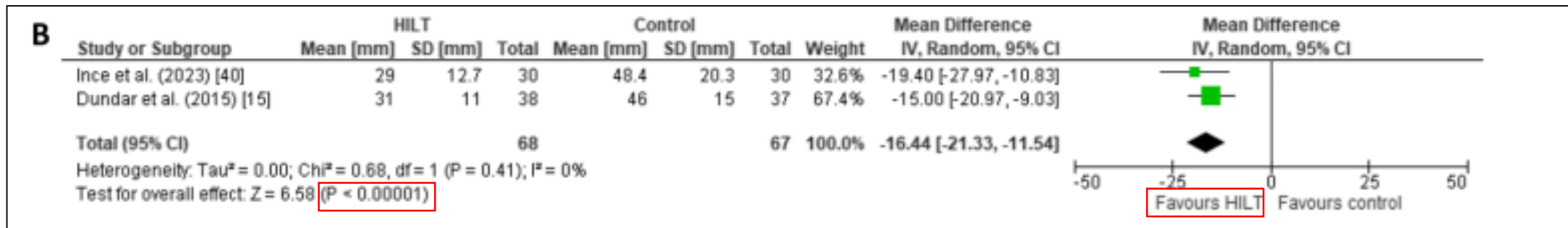
鈹雅克雷射

10~40

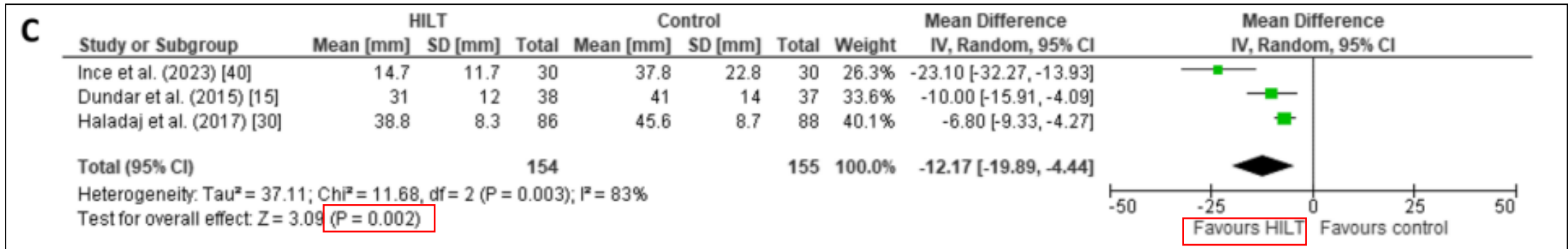
Pain intensity at rest(VAS)



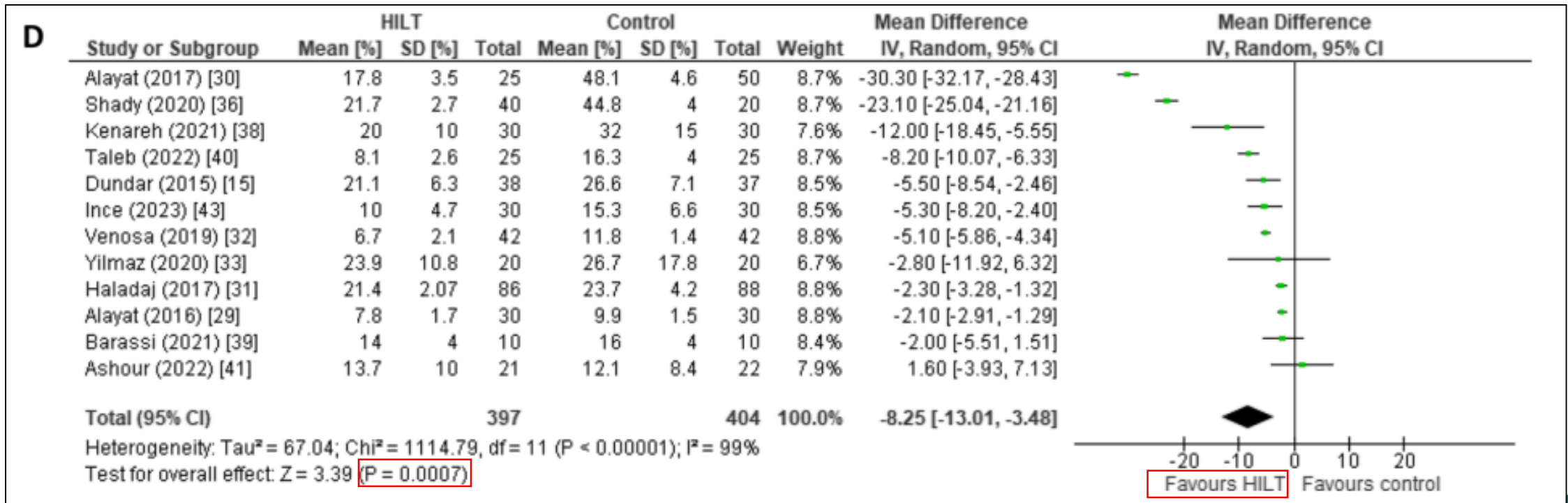
Pain intensity at movement(VAS)



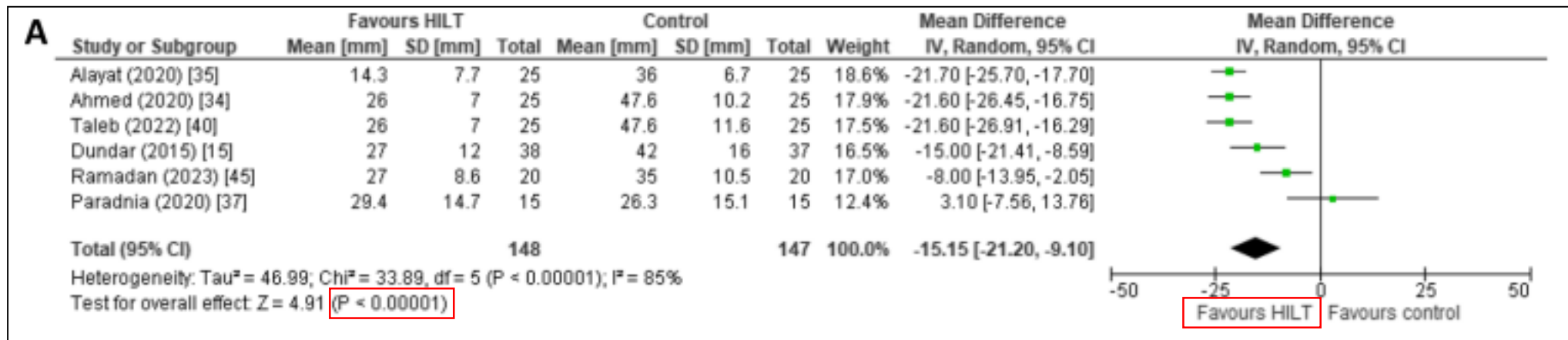
Pain intensity for follow-up (3 month)



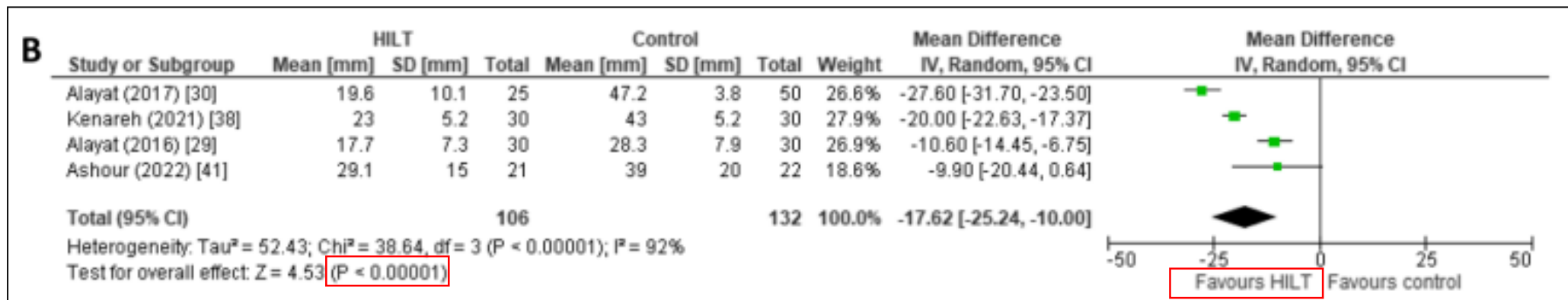
Disability after treatment



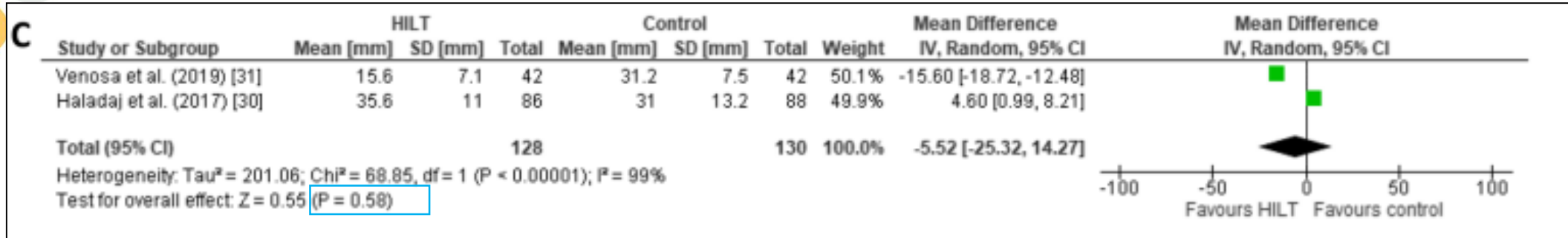
Pain intensity at rest at the end of treatment for myofascial pain



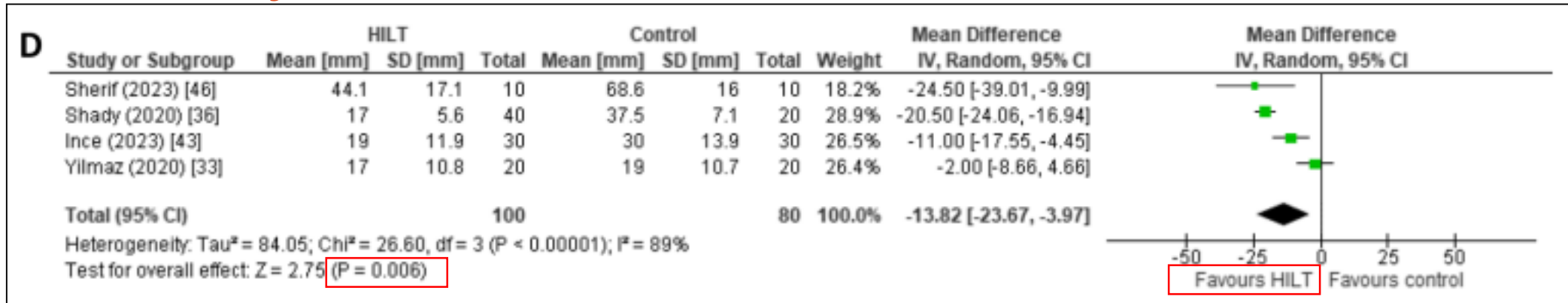
Pain intensity at rest at the end of treatment for chronic neck pain



Pain intensity at rest at the end of treatment for cervical spondylosis



Pain intensity at rest at the end of treatment for cervical radiculopathy

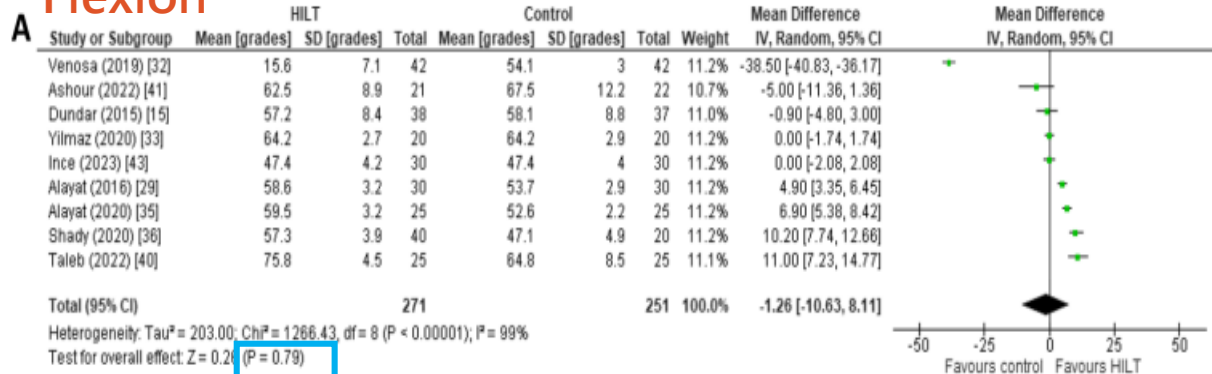


Comparing HILT versus placebo

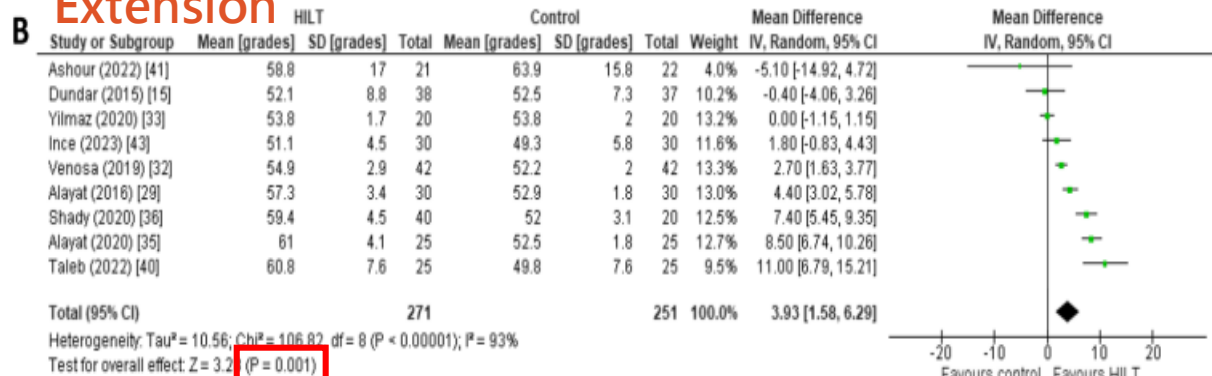


CROM

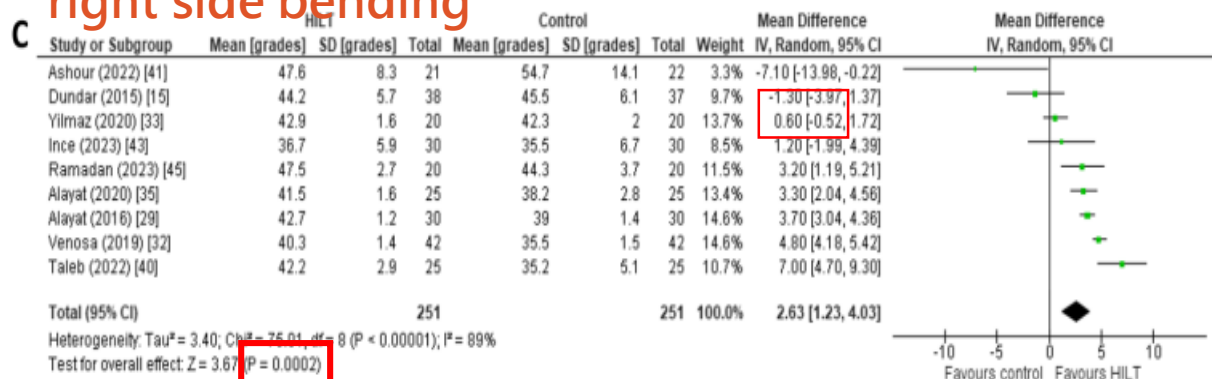
Flexion



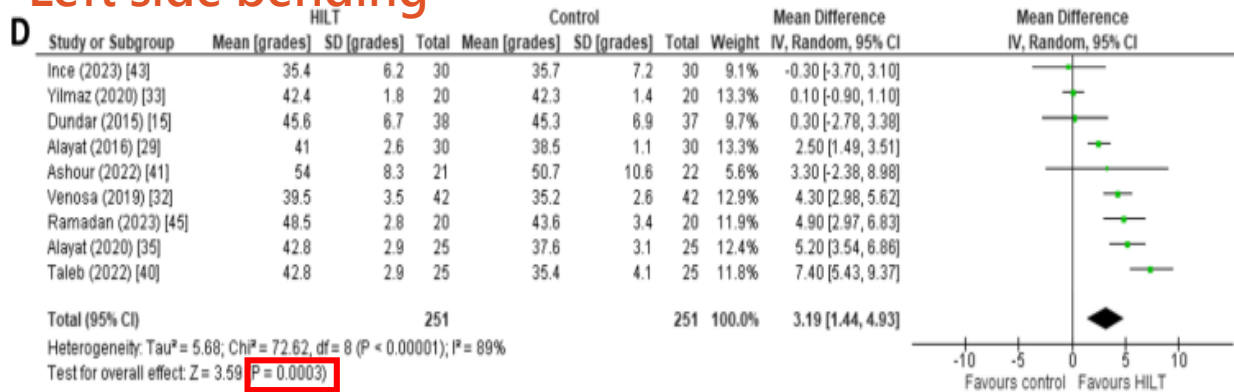
Extension



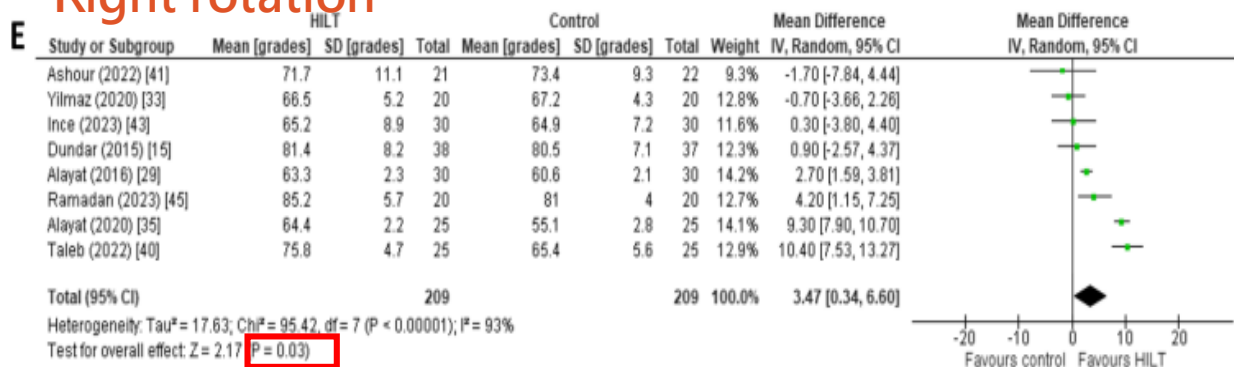
right side bending



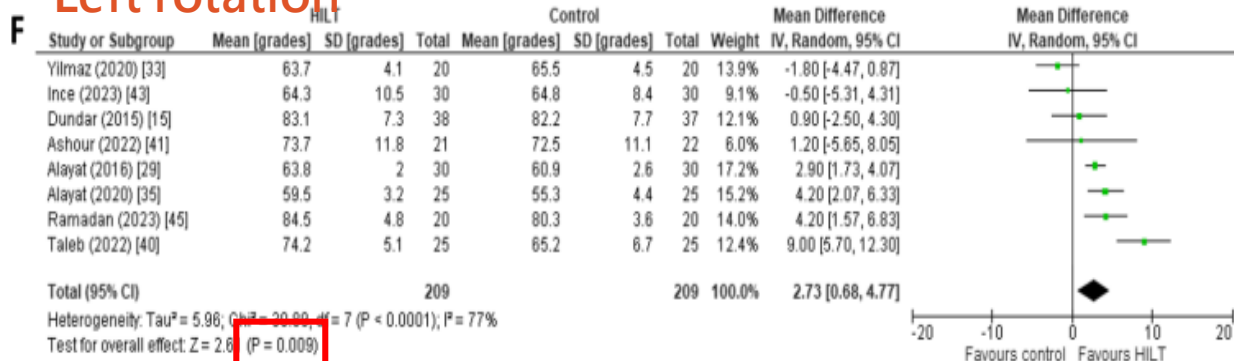
Left side bending

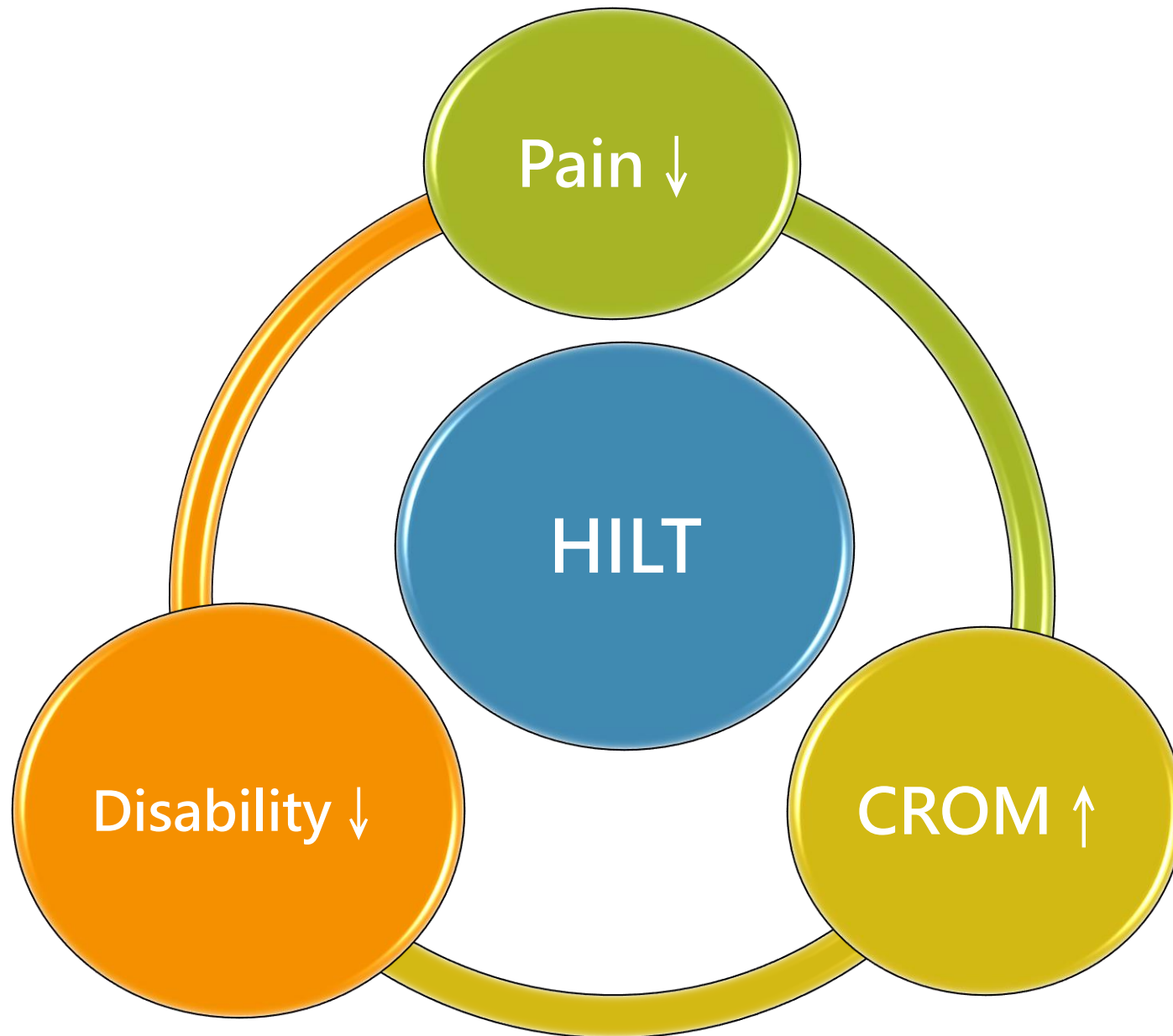


Right rotation



Left rotation





Discussion_Pain

- The pooled effect of these approaches results in a substantial reduction in pain by -15.3 mm (95% CI:-20.1,-10.4), and this pain relief endures for a duration of up to 3 months, with a decrease of -12.1 mm.

✓MCID: -13.7 mm

(Ann Emerg Med .2001;38(6):633–638)

- These results are in line with subgroup meta-analyses done on myofascial pain and chronic neck pain, where the pooled effect size was assessed to be -15.2 mm and -17 mm, respectively.

✓HILT works better for **non-degenerative neck disorders**

- Analgesic effects : photobiomodulation & thermotherapy

(J Clin Med. 2023; 12(4):1479) (Physiother Q. 2021;29(2):1–11) (Lasers Med Sci. 2023;38(1):266–273)

Discussion_CROM

- The improvements fall short of reaching the MCID for side-bending (LSB=5°; RSB=3°) and rotation (RR=10°; LR=5°), demonstrating clinical relevance primarily in neck extension (mean MCID=4°)

LSB	RSB	RR	LR	extension
3.19°	2.63°	3.47°	2.73°	3.9°

- The combination of heat and muscle stretching is recognized to enhance ROM, a principle that might extend to HILT in conjunction with stretching.

(Int J Environ Res Public Health.2020;17(15):5572)

- HILT mostly worked on the **paravertebral** and **trapezius muscles**, avoiding the front of the neck, where sensitive structures are located.

Discussion **Disability**

- The findings indicate that HILT has a positive impact on disability, surpassing conventional physical therapy.
- The meta-analysis reveals an improvement of 8.3%, which is lower to the MCID for NDI of 9.8% (equivalent to 6 points).

(Physiother Theory Pract 35. 2019;(12):1328–1335)

- A robust correlation exists between pain intensity and disability, implying that a treatment with analgesic effects is likely to impact disability

(European Spine Journal. 2008;17:80-88.)

Dosage recommendation

- The efficacy of **HILT** can be enhanced by incorporating specific stretching and resistance exercises for the neck.

Wavelength	1064 nm
Treatment technique	three phases
Sessions	2~3 sessions/week, ≥ 4 weeks

Discussion

• Limitation

1. Although eight sources of information were reviewed, including formal databases and some sources of gray literature, the authors cannot dismiss the possibility of new articles emerging from other sources of "gray literature"
2. **High heterogeneity** between studies makes it difficult to reach more solid conclusions about the evidence level of HILT in pain, CROM, and disability.
3. Some RCTs have **methodological limitations**, such as blinding and hidden allocation problems, which could influence their results.



(A) 研究結果可信嗎?

(B) 研究結果為何?





(C) 研究結果對於當地病人有幫助嗎?

CASSP
Critical Appraisal
Skills Programme

(A)研究結果可信嗎?

1. 此篇系統性文獻回顧是否問了一個清楚、明確的問題?

問題/研究族群 P roblem/Patient	<ul style="list-style-type: none">• Neck pain
給予的措施 I ntervention	<ul style="list-style-type: none">• High-intensity laser therapy
對照組 C omparison	<ul style="list-style-type: none">• Other physical therapy interventions, with or without the HILT placebo
結果 O utcome	<ul style="list-style-type: none">• Pain• CROM• Disability

	P opulation studied
	I ntervention given
	C omparator chosen
	O utcomes measured

是	V
不明確	
否	

(A)研究結果可信嗎?

2. 作者是否尋找適當研究型態的文獻?

This review considered the following inclusion criteria: a) human RCTs on neck disorders; b) studies in English, Spanish, or Portuguese; c) treatment with HILT as either the sole intervention or in combination with other therapies; d) comparison with other physical therapy treatments or HILT placebo; e) the main outcome was centered on pain intensity changes. Literature reviews and other SRs on HILT, neurological or musculoskeletal disorders from another body region, and studies with incomplete or unavailable texts were excluded. No time limitation has been set for the search, considering the recent emergence of HILT and the potential limitation in the quantity of available studies.






評讀的面向	
	有提及系統性文獻回顧的問題
	有適當的研究設計 (RCT)

是	V
不明確	
否	

(A)研究結果可信嗎?

3. 你認為所有重要且相關的研究都被納入?

A comprehensive search for randomized controlled trials (RCTs) involving HILT for treating NP was conducted. The search covered eight electronic databases, including PubMed, Scopus, Web of Science, CINAHL, Science Direct, Cochrane Library, the Physiotherapy Evidence-Based Database (PEDro), and Google Scholar (updated January 7, 2024). Searching was performed using a set of keywords selected from the Medical Subject Headings (MeSH) dictionary. Keywords included: "lasers", "laser

評讀的面向	
	使用資料庫 (PubMed, Web of Science, Scopus, CINAHL, Science Direct, Cochrane Library, and the PEDro database)
	是否從參考資料清單中再進行搜尋
	與專家進行個別聯繫
	除了已發表的研究文獻，也搜尋未發表的研究文獻
	搜尋非英文的研究文獻
	出版日期無受限

是	V
不明確	
否	

(A)研究結果可信嗎?

4.系統性文獻回顧的作者是否評估所納入研究文獻的品質?

Author (Year) [n]	Random sequence generation (selection bias)	Allocation concealment (selection bias)	Blinding of participants and personnel (performance bias)	Blinding of outcome assessment (detection bias)	Incomplete outcome data (attrition bias)	Selective reporting (reporting bias)	Other bias
Ahmed (2020) [34]	+	+	+	+	+	+	+
Alayat (2016) [29]	+	+	+	+	+	+	+
Alayat (2017) [30]	+	+	+	+	+	+	+
Alayat (2020) [35]	+	+	+	+	+	+	+
Ashour (2022) [41]	+	+	+	+	+	+	+
Barassi (2021) [39]	+	+	+	+	+	+	+
Conforti (2013) [28]	+	+	+	+	+	+	+
Dundar (2015) [15]	+	+	+	+	+	+	+
Dundar (2023) [42]	+	+	+	+	+	+	+
Haladaj (2017) [31]	+	+	+	+	+	+	+
Ince (2023) [43]	+	+	+	+	+	+	+
Kenareh (2021) [38]	+	+	+	+	+	+	+
Narvar (2023) [44]	+	+	+	+	+	+	+
Paradnia (2020) [37]	+	+	+	+	+	+	+
Ramadan (2023) [45]	+	+	+	+	+	+	+
Shady (2020) [36]	+	+	+	+	+	+	+
Sherif (2023) [46]	+	+	+	+	+	+	+
Taleb (2022) [40]	+	+	+	+	+	+	+
Venosa (2019) [32]	+	+	+	+	+	+	+
Yilmaz (2020) [33]	+	+	+	+	+	+	+

Two researchers (XXXXX and XXXXX) used the Rayyan web tool to review the article titles and abstracts from each database before registering them in a Microsoft Excel template [22]. Subsequently, full texts of potential articles were obtained for comprehensive review, considering factors like NP conditions, participant demographics, selection criteria, group interventions, assessments, and interesting outcomes.

評讀的面向



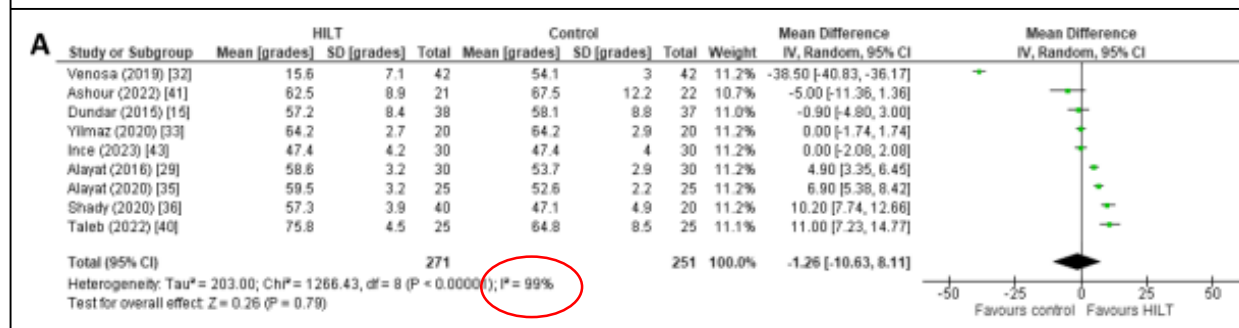
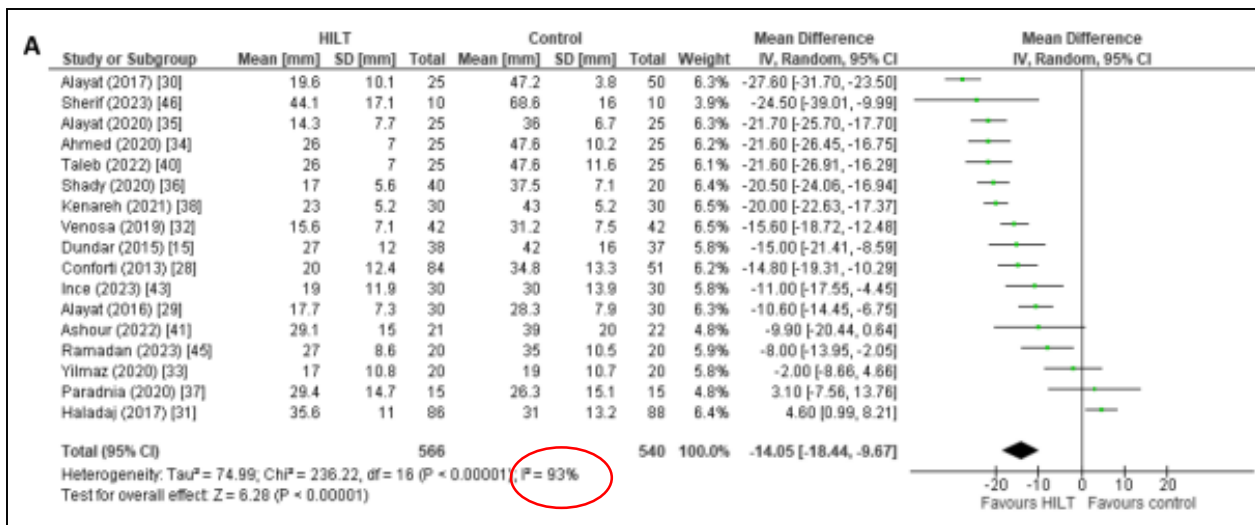
使用GRADE評讀systematic reviews

當2位獨立評讀人員文獻出現分歧，會再由第3人評估

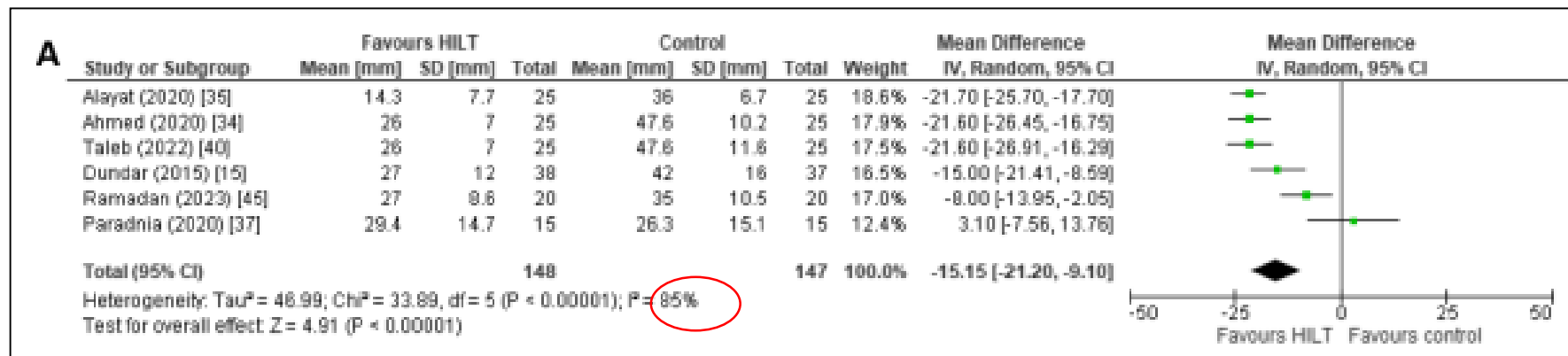
是	
不明確	V
否	

(A)研究結果可信嗎?

5.如果作者將研究結果進行合併，這樣的合併是否合理?



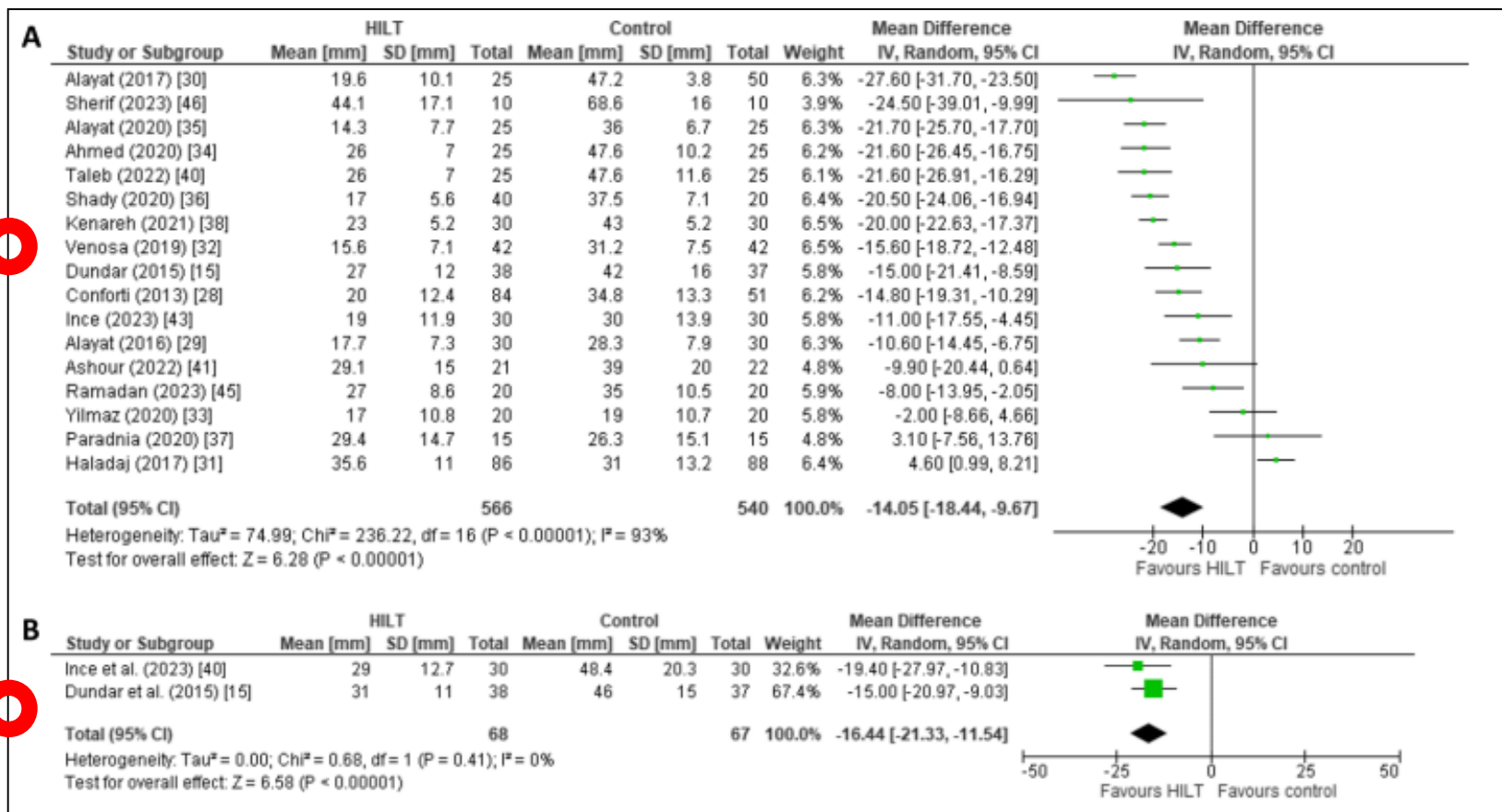
是	
不明確	
否	



(B)研究結果為何?

6. 這篇系統性文獻回顧的整體結果為何?

(1) Pain intensity



其結果顯示: 對於頸痛病人HILT介入組相較於控制組的疼痛減少有顯著進步

(B)研究結果為何?

6. 這篇系統性文獻回顧的整體結果為何?

(2)CROM

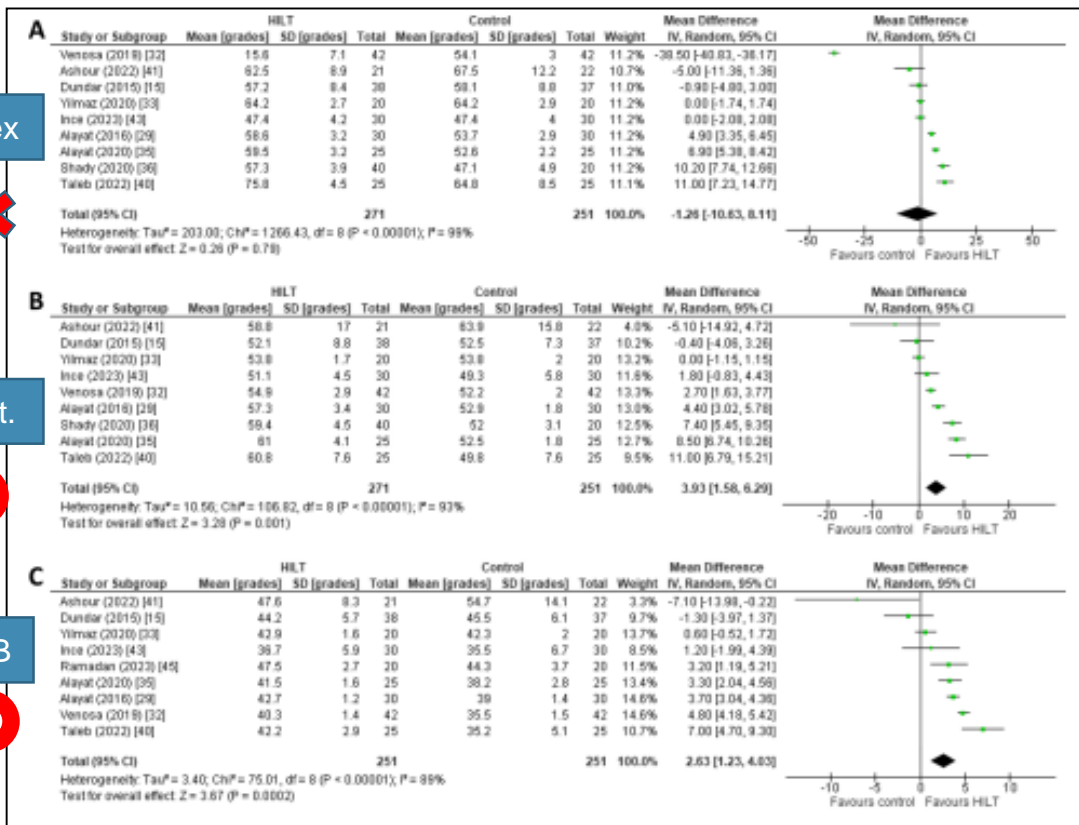
Flex



Ext.



RSB



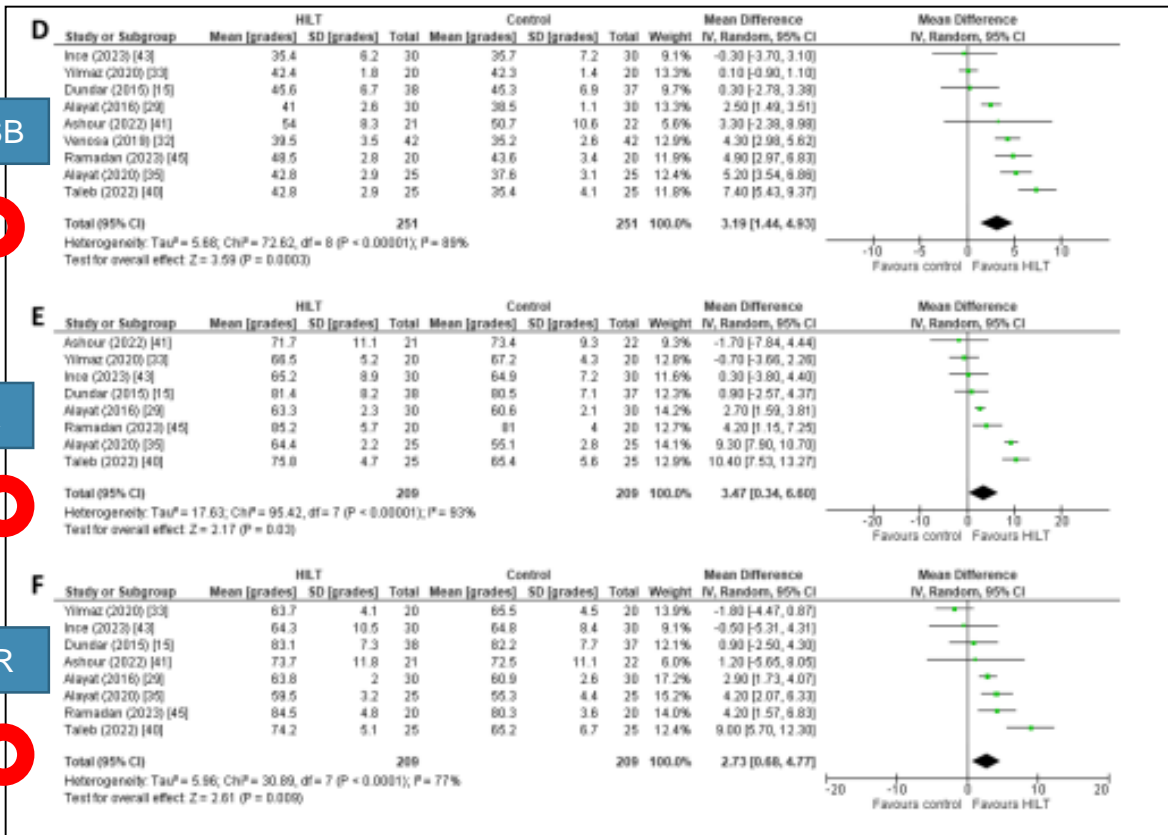
LSB



RR



LR

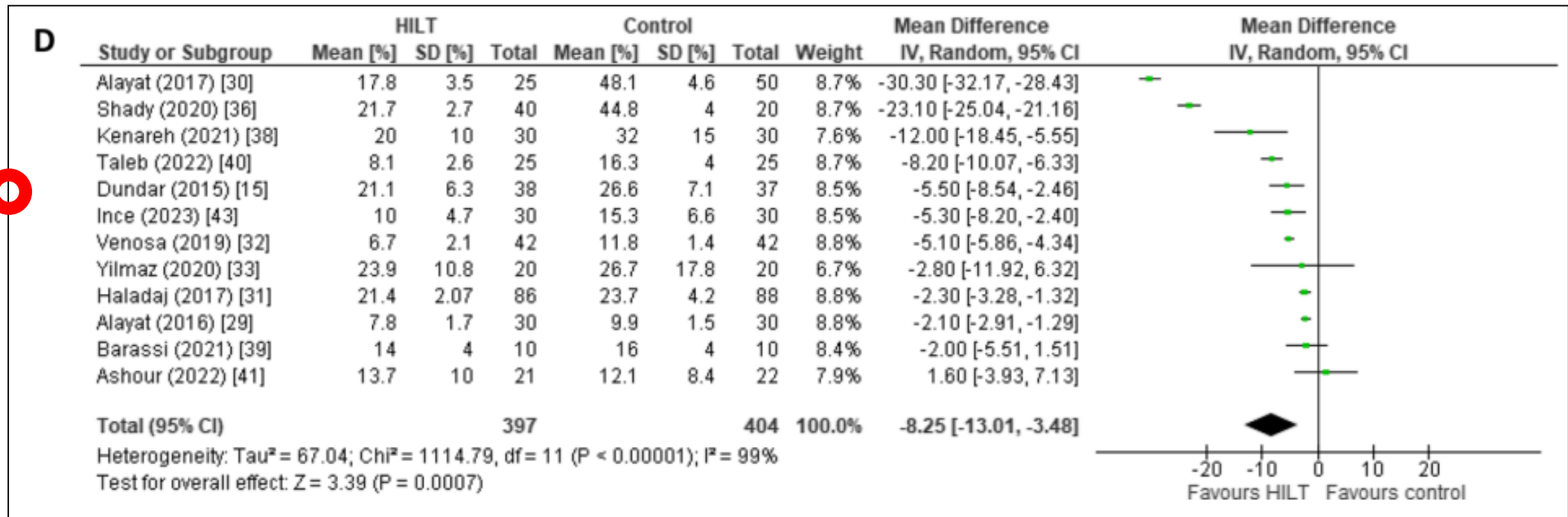


其結果顯示: 對於頸痛病人HILT介入組相較於控制組的頸部活動度有顯著進步

(B)研究結果為何?

6. 這篇系統性文獻回顧的整體結果為何?

(3) Disability

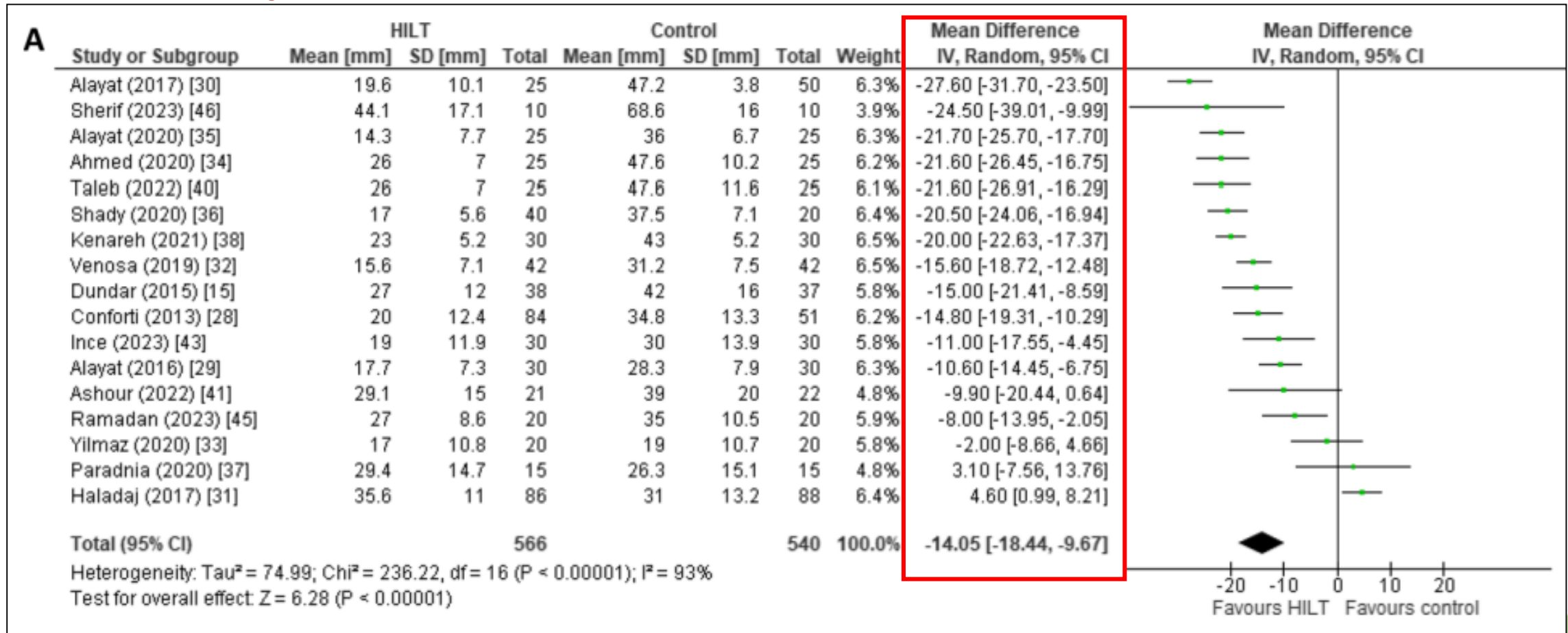


其結果顯示: 對於頸痛病人HILT介入組相較於控制組的失能減少有顯著進步

(B)研究結果為何?

7. 結果精準嗎?

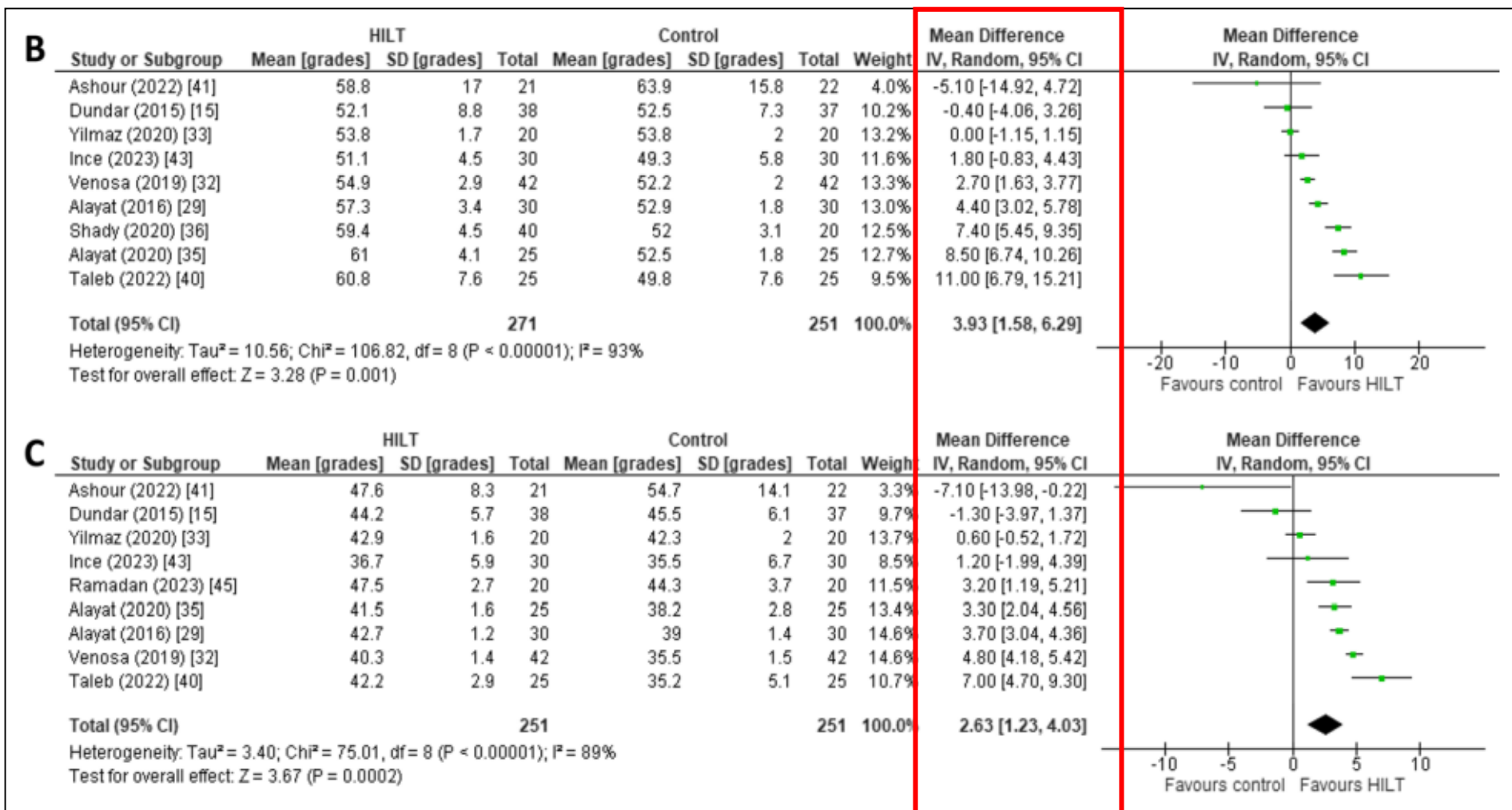
(1) Pain intensity



(B)研究結果為何?

7. 結果精準嗎?

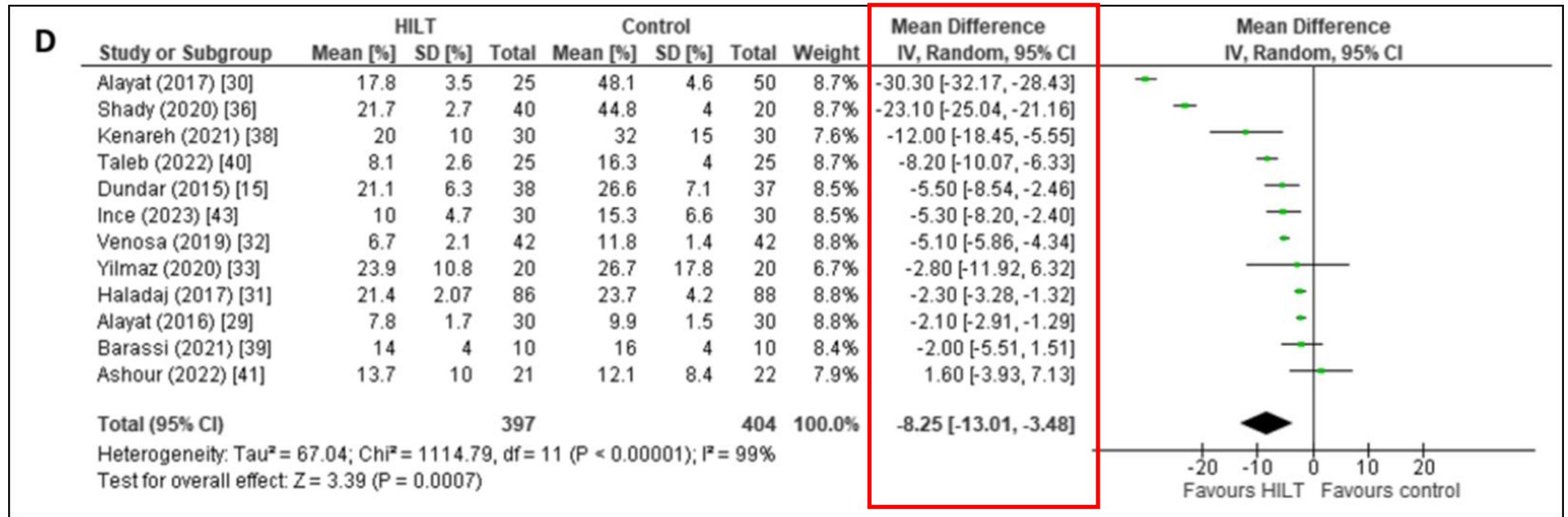
(2)CROM



(B)研究結果為何?

7. 結果精準嗎?

(3) Disability



(C)研究結果對於當地病人有幫助嗎?


8. 此研究結果是否可應用到當地的族群?

Table 2 Characteristics of included studies

Author Year Country	Clinical condition	Total (n) Groups (n) Mean age (x ± SD)	Intervention	Sessions	Assessment	Outcomes
1 Conforti 2013 Italy	Whiplash	n = 135 EG = 84 (35♂; 49♀) CG = 51 (27♂; 24♀) mean age NS	EG: HILT CG: PT	8 s (4 weeks)	T0: baseline T1: 1 week (post-treatment)	PI (VAS) Time length recovery (days)
2 Dundar [15] 2015 Turkey	Myofascial pain	n = 75 EG = 38 (0♂; 38♀) CG = 37 (0♂; 37♀) mean age NS	EG: HILT + TE CG: Sham HILT + TE	15 s (3 weeks)	T0: baseline T1: 4 weeks (post-treatment) T2: 12 weeks (follow-up)	PI (VAS) CROM (GNM) Disability (NDI) QoL (SF-36)
3 Alayat [29] 2016 Saudi Arabia	Chronic neck pain	n = 60 EG = 30 (30♂; 0♀) CG = 30 (30♂; 0♀) 35.5 ± 0.8	EG: HILT + cervical glide MWM + TE CG: Sham HILT + cervical glide MWM + TE	12 s (6 weeks)	T0: baseline T1: 6 weeks (post-treatment)	PI (VAS) CROM (GNM) Disability (NDI)
4 Alayat [30] 2017 Egypt	Chronic neck pain	n = 75 EG = 25 (NS) CG1 = 25 (NS) CG2 = 25 (NS) 45.2 ± 6.1	EG: HILT + TE CG 1: LLLT + TE CG 2: Sham HILT + TE	12 s (6 weeks)	T0: baseline T1: 6 weeks (post-treatment)	PI (VAS) Disability (NDI)

Characteristics/ Parameters	Paradnia (2020) [37]	Kenareh (2021) [38]	Barassi (2021) [39]	Taleb (2022) [40]	Ashour (2022) [41]	Dundar (2023) [42]	Ince (2023) [43]	Namvar (2023) [44]	Ramadan (2023) [45]	Sherif (2023) [46]
Laser model	Omega Laser device (NewAge Inc, Italy)	VELAS II-15B	Medilaser 15 ED (Medisport Srl, Latina, Italy)	ZIMMER OPTOPRO	ZIMMER OPTOPRO	BTL-6000 HILT	HIRO 3.0 (ASA laser, Arcugnano, Italy)	K-LASER, made Italy	Omega Laser device (NewAge Inc, Italy)	LEVELASER EZ1 EASY-ONE 5W
Wavelength	1,064 nm (Nd:YAG)	1,064 nm (Nd:YAG)	1,064 nm and 810 nm (Nd:YAG)	810 nm and 980 nm (dual)	980 nm	1,064 nm (Nd:YAG)	1,064 nm (Nd:YAG)	660, 800, 905 and 970 nm	1,064 nm (Nd:YAG)	980 nm (Ga-Al-Ar)
Mode (continuous/pulsed)	continuous/pulsed	continuous/pulsed	continuous/pulsed	continuous/pulsed	pulsed	pulsed	pulsed	continuous/pulsed	continuous/pulsed	pulsed
Peak power	14 W	NS	15 W	7 W	7 W	3,000 W	3,000 W	20 W	14 W	5 W

評讀的面向



	病人與本地族群亞洲與非亞洲文獻與人次無統計學上差異
	使用雷射器材部分是相同
	訓練模式, 時間, 頻率不一定

大部分是義大利、土耳其、埃及、波瀾及伊朗等

是	
不明確	V
否	

(C)研究結果對於當地病人有幫助嗎?



9. 是否所有重要的臨床結果都有被考量到？

評讀的面向	
	Pain
	CROM
	Disability

是	V
不明確	
否	

(C)研究結果對於當地病人有幫助嗎?

10. 付出的傷害和花費換得介入措施所產生的益處是否值得？

評讀的面向		是	
	高費用		
	傷害	不明確	V
	時間成本、便利性	否	



感謝聆聽，敬請指導！

