Safety and Efficacy of Therapeutic Taping in Primary Dysmenorrhea: a Systematic Review and Meta-analysis

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Abstract

Primary dysmenorrhea (PD) is a common gynecological complaint among adolescents and adult women. Various pharmacological and alternative therapies such as therapeutic taping have been used as a treatment of PD. Although several studies have been conducted to evaluate the safety and efficacy of therapeutic taping in PD, these studies have not provided adequate level of evidence related to the safety and efficacy of therapeutic taping in PD. Hence, a systematic review and meta-analysis was performed to evaluate the safety and efficacy of therapeutic taping in PD. The following databases; Medline, Cochrane Library, Embase, PEDro, CINAHL and any other gray literature sources were searched for randomized controlled trials (RCTs) that used therapeutic taping to treat PD from inception to June 2021 with the language restricted to English. Independently screened articles by two reviewers were extracted according to the study objectives. A total of nine studies were included in the systematic review, involving 577 participants. Three studies were eligible for meta-analysis to find the pooled effect of taping on pain intensity. The review indicates that therapeutic taping is an effective measure in improving pain, anxiety and quality of life of women with PD. Meta-analysis conducted to compare the effect of elastic therapeutic taping (ETT) to sham taping showed that the ETT is an effective measure in improving pain among women with PD (MD = -3.12 (95% CI -5.64, -0.60); p=0.02; I^2=95 %). The quality of the studies was assessed using the PEDro scale and the included RCTs indicated a fair to good level of quality. Our systematic review and meta-analysis demonstrated that therapeutic taping is an effective intervention for PD. However, RCTs with higher quality and larger sample sizes are necessary to verify the current results of the review.

Introduction

Dysmenorrhea is a painful, cramping sensation that occurs in the lower abdominal area accompanied by other biological features such as, backpain, nausea, vomiting, sweating, dizziness, headache, diarrhea and tiredness [1]. These symptoms usually occur a few days before or during menstruation [1, 2]. The burden of dysmenorrhea is significantly higher than any other gynecological complaint [3]. It is a prominent cause of gynecological morbidity in females of reproductive age [4, 5]. Prevalence is high, with 45–93% of women in their reproductive age experiencing dysmenorrhea, and the highest rates are reported in adolescent girls [3, 6]. Depending on the pathophysiology, dysmenorrhea can be divided into two categories; primary and secondary [7]. Primary dysmenorrhea (PD) is described as a cramping pain in the lower abdomen which occurs without any obvious pelvic pathology [1]. Secondary dysmenorrhea is described as the menstrual pain caused by underlying pelvic pathology such as endometriosis, adenomyosis, intra uterine adhesions, cervical stenosis, ovarian cysts, uterine myomas or polyps, infertility problems and pelvic inflammatory disease and the onset may be years after first menstruation [8, 9]. PD first occurs after menarche, in women who are under 20 years of age [1]. The exact cause of PD is not well identified. However, it is hypothesized that excessive production of uterine prostaglandins, particularly of PGF2a and PGF2 is involved in the pathogenesis of PD [10]. Excessive uterine prostaglandin levels lead to increased uterine tone and high amplitude contractions [10]. Several risk factors for PD have been identified, such as age (< 20 years), smoking, nulliparity, longer and heavy menstrual flow, high body mass index (BMI), earlier onset of menarche, family history, depression, anxiety and stress [11, 12]. Women experiencing PD often have poor physical, mental and social wellbeing due to the negative impact dysmenorrhea can have on everyday life. Poor academic performance, absenteeism from school and work, limitations on daily activities, poor quality of sleep, increased levels of stress, anxiety and depression are examples of the reported consequences of PD [1, 4, 8]. Consequences not only affect women on an individual level, but they also have an impact on the community and economy with decreased productivity leading to economic loss [1, 4]. However, most women do not report or seek medical attention for PD, because it is considered a normal feature of menstruation [13].

Both pharmacological and nonpharmacological treatments are available to manage PD [14], while surgical procedures are also available for extreme cases [15]. Pharmacological treatments target the physiological mechanisms associated with menstrual pain and other symptoms. Aspirin, paracetamol and nonsteroidal anti-inflammatory drugs (NSAIDs) are believed to reduce the activity of cyclo-oxgenase pathways, thus inhibiting excessive production of prostaglandins. Oral contraceptives are also used to inhibit ovulation. A combination of analgesics and oral contraceptives may be useful in cases where women don't respond to a single treatment [7]. There are some side-effects associated with analgesics and contraceptives such as gastrointestinal disturbances (nausea, vomiting and diarrhea) with the use of NSAIDS while nausea, abdominal pain, headache, acne, bloating, anxiety, loneliness and weight gain were observed with the use of oral contraceptives [7,16]. Approximately, 10–20% of women do not respond to pharmacological management and some may have contraindications for the use of NSAIDs and oral contraceptives [7]. Evidence shows that the use of alternative treatments can be effective in relieving pain and symptoms. Some examples include herbs such as aloe vera, chamomile, cinnamon, fennel, and ginger [17], dietary changes such as a low-fat vegetarian diet, vitamins (B, C, E), and supplements (calcium and magnesium) [18, 19, 20], hypnosis and psychotherapy [19, 20]. Physiotherapy treatments also play a role in managing PD. Generally, physiotherapy treatments for PD include heat therapies, exercises, relaxation therapies, connective tissue massage, acupressure, acupuncture, Transcutaneous Electrical Nerve Stimulation (TENS), spinal manipulation and taping such as kinesio-taping (KT) and elastro-tapes [20, 21].

There are a variety of tapes available, each with different types, materials and uses. Common tapes are; rigid tapes (a non-elastic and non-permeable), kinesio tapes, elastic tape, and spiral tapes (a non-elastic synthetic tape applied in a spiral or grid shape) [22]. Spiral tapes may generate cutaneous stimuli, reduce pain and swelling, improve circulation and regulate muscle tone and metabolism [23]. Kinesio taping (KT) is a specially designed elastic tape designed to maintain air permeability, be water-resistant and contain hypoallergic materials. This taping type is clinically used widely as it has a strong adherence capacity, low risk of skin irritation, easy and self-applicability, and long-lasting capacity. KT is found to be effective in reducing pain, supplying proprioceptive feedback, stimulating muscle activity, supporting weak muscles, and increasing lymphatic and blood flow to the applied area [24,25].

There are several research studies that have investigated the effectiveness of taping on PD, however there is no systematic review or a meta-analysis. This current systematic review and meta-analysis aims to determine whether taping is an effective and safe treatment for PD in improving pain and related clinical symptoms such as anxiety.

Method

The study protocol for this systematic review was registered with International prospective register of systematic reviews (PROPERO) on 24th June 2021 (CRD42021256578).

Eligibility criteria

Randomized controlled trials (RCT) published in English were included if they assessed women, of any age, with PD. Study participants had to be treated with therapeutic tape applications aimed to treat pain associated with PD (alone or as a combination with another therapy) e.g.: elastic therapeutic tape (ETT), rigid therapeutic tape (RTT) and spiral tape. Studies with other therapeutic intervention, sham taping or no intervention control groups were included. Studies also had to include a measure of pain to be considered eligible for inclusion. Studies which satisfied the following criteria were excluded; study protocols, abstract-only papers (eg: proceeding papers, conference abstracts, editorials, and commentaries), and where full text were not available.

Search strategy

We searched the following electronic databases; CINAHL, Cochrane Library, EMBASE, MEDLINE and PEDro; with keywords related to therapeutic taping and PD. All searches were conducted from inception to May 2021. The MEDLINE search strategy is provided in Appendix 1. Additionally, Google Scholar was searched using the same keywords to identify other potential studies.

Study selection process and screening

All references were exported to Endnote and then transferred to Covidence for de-duplication, screening and data extraction. Two reviewers independently screened the title and abstract against a pre-defined eligibility criterion. The full texts of relevant abstracts were then screened by the same reviewers using the same process. Disagreements were resolved by consensus. The number of included and excluded articles at the different phases was recorded as recommended by PRISMA guidelines and presented in a flowchart (Fig. 1).

Data extraction

The following data were independently extracted from the included studies by two reviewers. Any disagreements were resolved through discussion or by consultation a third reviewer. Publication details including research title, author details, year of publication, country of investigation; details of the sample including sample size and age of each control/intervention group; details of the intervention and comparison groups including type and taping technique, frequency and treatment duration, outcome indicators and the significance of findings (eg: pain score, pain duration, anxiety and menstrual discomfort measures) and, adverse events. When the information was missing, or unclear relevant authors were contacted to obtain the necessary information.

Data analysis

Collated evidence was summarized and presented narratively using tables and graphs. Where possible, similar studies were pooled together for meta-analysis.

The meta-analysis was conducted using random effect model if statistical heterogeneity, $I^2 > 50$, and the mean difference (MD) was used if the studies used the same tool to measure the interested outcomes. Each effect was expressed at 95% of confidence interval and statistical significance at $p < 0.05$. The statistical analysis was carried out in RevMan5.4 software.

Quality assessment

Quality of the included studies was assessed using the PEDro scale [26]. Two reviewers independently assessed the quality of the included RCTs and any discrepancies were resolved by consensus. The PEDro scale consists of 11 scored items. The first item relates to the eligibility criteria and is not included in the final PEDro score. The scores from the remaining 10 items are added together to generate an overall PEDro score which is used to determine the quality of the study. Eight of these items are related to the methodological quality of the study (e.g. allocation, baseline comparability, blinding, adequate follow up and intention-to-treat). The final two items are related to statistical reporting (between group comparison, point estimates and variability) [26].

Grading of evidence

Grading of evidence was done based on the PEDro score. The evidence was categorized into three levels of strength; strong, moderate and low [27] where a strong level evidence was defined as the evidence stemming from preponderance of high quality RCTs (PEDro 7–10). Moderate level evidence was defined as the evidence stemming from findings if one high quality RCT, inconsistent findings from preponderance of high quality RCTs, or consistent findings from preponderance moderate quality RCTs (PEDro 4–6) while low level evidence was defined as the evidence stemming from findings if one moderate quality RCT, inconsistent findings from preponderance of moderate quality RCTs, or consistent findings preponderance of low quality RCTs (PEDro 0–3).

Data availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable requests.

Results

Study selection

Two hundred and ninety studies were found during the search (number of records through database search, n=288; n=2 through other sources). There were 41 duplicate records removed leaving 249 studies which were screened at the title and abstract screening phase. After excluding 224 records, 25 full texts were

screened leaving nine studies for final inclusion in the systematic review. Data from three studies were pooled together for a meta-analysis. The study selection process is presented in Figure 1.

Characteristics of the included studies

The included nine RCTs enrolled a total of 577 subjects. A total of 250 subjects were enrolled in the experimental group and received therapeutic taping. Control groups included other therapies (n=146), sham taping (n=93) or no intervention (n=88) (Table 1).

Quality evaluation

Methodological quality was assessed using PEDro scale (Table 2). The PEDro score of the included studies ranged from 4 to 7. All the studies satisfied the baseline comparability and between group comparison criteria. However, no study met the criteria for subject blinding and therapist blinding (Figure 2).

Evidence summary

Favorable evidence was found for the effect of Kinesio taping on quality of life outcomes with the evidence being of high quality (Table 3). Favorable evidence was found on the effect of Kinesio taping on pain intensity and anxiety with the evidence being of moderate quality (Table 3). Favorable evidence was found on the effect of spiral taping and balance taping on pain intensity (Table 3).

Study	Country	Population (sample, age, setting)	Sample size	Intervention		Duration of treatment		Outcome Indicators (tool)	Res
				Experimental (sample size)	Comparison (sample size)	Experimental	Comparison		
Pazare 2019	India	Females with PD 18-25 years PCMC area, Pune	40	KT (20)	Isometric Exercises (20)	3 weeks (six times twice a week starting from 14 days before menstruation until its end)	8 weeks (since the third day of their menstrual cycle 5 days a week, two sessions a day, and 10 times per Session)	Pain intensity (VAS)	KT sig imp pai con iso exe
Dogan 2020	Turkey	Nulliparous females diagnosed with PD Over 18 years NR	60	KT + Lifestyle changes (30)	Lifestyle changes (30)	1 month (first day of the second menstrual cycle to the first day of the third menstrual cycle)	1 month (first day of the second menstrual cycle to the first day of the third menstrual cycle)	Pain intensity (VAS) Number of analgesics The Quality of life (Turkish version of the SF-36) scale	KT wit cha sig imp pai red qua and awa con life cha alo
Kaur 2017	India	Female students with complains of PD, Between 18-25 years MVP's college of Physiotherapy, Nashik;	40	KT (20)	Connective Tissue Mobilisation (20)	3 days ((starts one day before menstruation)	3 days (starts one day before menstruation. The intervention consisted of 20 minutes session)	Pain intensity (NRS)_	Bot con tiss mo are eff imp pai
Boguszewski 2020	Poland	Females with complaints of pain during menstruation NR NR	44	Elastic K-Active® KT (16)	Placebo application by using an inelastic tape (14) No intervention (14)	5 days	5 days 5 days	Pain intensity (VAS) Pain severity (modified version of the Laitinen questionnaire) Anxiety (Spielberger statetrait anxiety inventory (STAI-X1)	Bot pla app ma me pai Hov sta sig dif bet inte Anx sig imp wit con oth
Abdelaziz 2020	Egypt	Females with complaints of pain and cramping during menstruation	60	KT (30)	Pilate exercises (30)	Three consecutive menstruation – begins one day before menstruation and would be remain adhered for	12 weeks: 3 days a week, except the days of menstruation	Pain intensity (VAS) Quality of life enjoyment and satisfaction (Q-LES-Q-SF)	Bot pila exe wer eff imp of qua and

		Between 14 to 20 years Gynecological and obstetric outpatient clinic of Eltebeen central hospital				around four to five days.		Anxiety levels (Spielberger questionnaire (State-Trait Anxiety Inventory (STAI) Form Y-1 and Y-2))	Pila exe was to K tern redu qua imp and relie
Rodríguez 2015	Spain	Female students who suffer from PD NR School of Medicine from the Universidad Miguel Hernández of Elche	129	A special elastic and hypoallergenic surgical tape (Cure Tape) (75)	Non-extendible meshed bandage patches (Cross Tape) (54)	4-5 days from menstruation (Until pain disappears)	4-5 days from menstruation (Until pain disappears)	Pain intensity (a 10-point scale (0 = no pain and 10 = maximum pain))	Cur app sign imp pai me inta con pla app
Celenay (2020)	Turkey	Females with PD, who were nulliparous Between 18 to 35 years NR	45	KT (15)	Sham tape (15) Control group (15)	1 month (two days a week, from the estimated day of ovulation (cycle length in days minus 14) until the next period begins)	1 month (two days a week, from the estimated day of ovulation (cycle length in days minus 14) until the next period begins) 1 month	Pain intensity (VAS) The level of anxiety (STAI)	KT sign imp pai and anx con ST app and app
Yum (2017)	Republic of Korea	Female students Between 13–15 years Middle school located in Seoul	125	Balance taping (33)	Medication - 1 dose of Tylenol 500 mg (46)	Start - on the morning following when they started their period Pain intensity was measured right before the taping, as well as 1 hour, 4 hours, 8 hours, and 24 hours after	The medication group took only 1 dose of Tylenol 500 mg, but midterm and final exam periods were made an exception Pain intensity was measured right before the taping, as well as 1 hour, 4 hours, 8 hours, and 24 hours after	Pain intensity (VAS)	Bal tap sign imp pai con me

					Control group (46)				
Lim (2013)	Korea	Unmarried, non- parous females without pathologic findings in the pelvic cavity, whose menstrual pain scores were five or higher on a visual analogue scale (VAS) In their twenties and thirties NR	34	KT (11)	Spiral taping (10) Control group (13)	Three weeks – total six times (twice a week starting from 14 days before menstruation until its end)	Three weeks – total six times (twice a week starting from 14 days before menstruation until its end) Three weeks	Pain intensity (VAS)	Bot spi sig imp pai Kin was eff pai

Abbreviations: KT, kinesiotaping; PCMC, Pimpri-Chinchwad Municipal Corporation; PD, primary dysmenorrhea; Q-LES-Q-SF, Quality of life enjoyment and satisfaction; NR, not reported, NRS, numerical rating scale; STAI-X1, (Spielberger statetrait anxiety inventory; ST, sham taping; VAS, visual analogue scale

Table 1: Characteristics and summary findings of the included studies

Study	PEDro scale item											PEDro
	1*	2	3	4	5	6	7	8	9	10	11	Score
Abdelaziz 2020	Y	Y	Y	Y	N	N	N	Y	Y	Y	Y	7
Boguszewski 2020	N	Y	N	Y	N	N	N	N	N	Y	Y	4
Celenay 2020	N	Y	N	Y	N	N	N	Y	N	Y	Y	5
Dogan 2020	Y	Y	Y	Y	N	N	Y	Y	N	Y	Y	7
Kaur 2017	Y	Y	N	Y	N	N	N	Y	Y	Y	N	5
Pazare 2019	Y	Y	N	Y	N	N	N	N	N	Y	Y	4
Rodríguez 2015	Y	Y	N	Y	N	N	N	N	Y	Y	Y	5
Lim 2013	N	Y	N	Y	N	N	N	Y	N	Y	Y	5
Yum 2017	Y	N	N	Y	N	N	N	Y	N	Y	Y	4

Y: yes N:no *: Not considered for total score

1: Eligibility criteria 2: Random allocation 3: Concealed allocation 4: Baseline comparability 5: Blind subjects 6: Blind therapist 7: Blind assessor 8: Adequate follow up 9: Intention to treat analysis 10: Between group comparisons 11: Point estimates and variability

Table 2 Risk of bias evaluation of included studies

Outcome indicator	Type of therapeutic taping	Grading of evidence		
		Weak	Moderate	High
Pain intensity	Kinesio taping		X	
	Spiral taping	X		
	Balance taping	X		
Anxiety	Kinesio taping		X	
Quality of life	Kinesio taping			X

Table 3: Evidence summary

Effect of therapeutic taping vs no intervention

Four studies compared the effectiveness of therapeutic taping to a no-intervention control group [28-31]. A total of 173 subjects either received therapeutic taping (n=85) or no intervention (n=88). Three study (n=143) reported an immediate statistically significant pain improvement in therapeutic taping groups compared to no intervention groups [29-31]. The remaining study reported that there was no statistically significant difference in pain improvement among the groups within first 24 hours of treatment [28]. Two studies (n=60) reported a significant improvement of anxiety with KT application compared to no intervention. The overall PEDro scores of the four studies ranged from 4 to 5.

Effect of therapeutic taping vs sham taping

Three studies (n=189) compared the effectiveness of therapeutic taping to the sham taping [28,29,32]. All studies reported superior pain relief with therapeutic tape application. However, only two studies (n=159) found a statistically significant difference of pain relief when comparing therapeutic taping and sham taping [29, 32]. Two studies (n= 60) reported a significant improvement of anxiety with KT application compared to sham taping [28, 29]. The overall PEDro scores of the three studies ranged from 4 to 5.

Effect of therapeutic taping vs other interventions

Four studies (n=219) compared the effectiveness of therapeutic taping to other interventions (Pilates, isometric exercises, connective tissue mobilization or medication) [30, 33-35]. Two studies (n= 119) reported that the therapeutic taping was more effective in pain relief among women with PD compared to other interventions [30, 33]. Both studies had a PEDro score of 4. One study (n=40) reported that the kinesiotaping is similarly effective in relieving pain as connective tissue mobilization [34]. One study (n=60), with a PEDro score of 7, reported that Pilates exercises provided superior improvements in pain, anxiety and quality of life compared to kinesiotaping [35].

Effect of therapeutic taping as an adjunct

One study (n= 60), with a PEDro score of 7, reported that kinesio taping with lifestyle modification is more effective in pain relief, quality of life and body awareness compared to lifestyle modification alone [36].

Meta-analysis of studies assessing the effect of taping on pain intensity of people with PD

Three studies [29, 31 ,32] provided adequate data for a meta-analysis, therefore pooled together to quantitively assess the effect of taping on pain intensity in women with PD as assessed by a visual analogue scale (VAS) scale. Given that I^2 was 95%, a random effect model was used, and mean difference (MD) was chosen because all studies used a VAS to assess the pain intensity. They had investigated different types of taping as comparison (sham tape (multi-colored sports taping), non-extended tape and spiral taping). With pooled studies, 101 females with PD who were treated using taping (K-taping; n=2 and surgical taping; n=1) were compared with 82 who were treated with sham tape, non-extended tape or spiral taping. The pooled mean of those found to have decreased menstrual pain intensity among PD (pooled MD= -3.12 (95% CI ⁻5.64 - ⁻0.60); P=0.02; I^2=95 % (Figure 3).

Adverse events

Three studies investigated potential adverse effects of taping [29,30,36]. Two studies (n=60) treated with taping reported no adverse events among participants [29,36]. One study (n= 33) treated with taping application has reported that two participants have experienced skin allergic reactions and one person has experience dizziness as adverse reactions [30].

Evidence summary

Kinesiotaping is effective in immediate pain relief with low level of evidence. Studies with moderate level of evidence suggests that kinesiotaping is effective in improvement of anxiety associated with PD. Studies with moderate level of evidence suggests that kinesio taping is at least effective as other therapies such as isometric exercises, connective tissue mobilization and medication.

Discussion

This current systematic review and meta-analysis aimed to investigate whether taping is an effective and safe treatment for PD in improving pain, anxiety and quality of life. The summarized findings of the review indicate that a weak to high level of evidence exists to support therapeutic taping in improving pain intensity, anxiety and quality of life. Further, with moderate level of evidence, our meta-analysis confirmed that taping is an effective therapeutic application in improving pain of PD. Lastly, we found adverse effects in one study, where two patients reported allergic skin reactions and one patient reported dizziness with taping.

A previous systematic review which assessed the efficacy of physiotherapy treatment for PD indicated that kinesiotaping is an effective option in improving pain, anxiety and several menstrual complaints [37], similar to this review. However, López-Liria, R. et al only included one out of the nine eligible studies in this review. There are no other studies that the authors are aware of that explore the safety measures related to therapeutic taping application for PD.

According to the meta- analysis, therapeutic taping has a positive finding in improving pain intensity of females with PD. Abnormal increases of prostaglandin and vasopressin have been identified as the possible cause of PD [38]. This abnormal increase of the uterine hormones is known to shrink the uterus and thereby reduce blood and oxygen supply which may cause pain [38]. ETT applied on skin may induce underlying muscle contractions and relaxations which would improve uterine blood flow [39]. It is hypothesized that the pain inhibition attributed to tension generated from ETT stimulates afferent nerve fibers and facilitates pain inhibitory mechanisms [40]. Most included studies used kinesiotaping as the therapeutic taping application in this review. The potential pain reduction mechanism of KT application may include producing sensory tactile impulses on the skin that are able to block or reduce the arrival of pain sensations to the brain [41]. Also, KT application may increase blood flow by microscopically lifting the skin from the facia and activating the skin – organ reflex [42-44]. Though we found the adverse effects pf skin allergies and dizziness associated with therapeutic taping, considerably those adverse effects are minor and are no worse that adverse effects reported with the use of medication such as NSAIDs [45].

This is the first systematic review and meta-analysis to assess the effects of therapeutic taping for PD. There are several strengths of this review which include the comprehensive search strategy and the eligibility criteria we used to retrieve studies which used all types of therapeutic taping applications. All included studies used validated outcome measures of pain, anxiety and quality of life such as VAS, NRS, STAI and Q-LES-Q-SF. This review provides a rigorous view of the current evidence related to the therapeutic taping usage for PD. Additionally, this review provides directions to conduct future RCTs with higher quality to evaluate the safety and effectiveness of therapeutic taping application for PD. Studies which used sham or no intervention control groups provide useful information on the natural regression of clinical symptoms and placebo effect due to treatment expectations.

Some limitations have to be acknowledged. Studies were only included if they were published in English, potentially limiting the inclusion of all relevant research on this topic. The quality of the included studies was fair to good. Only two studies concealed participant allocation and only one study blinded the assessors. None of the studies blinded their subjects or therapists. These methodological flaws may pose a significant risk of bias. There were limited studies that could be pooled into a meta-analysis due to heterogeneity observed in outcomes and comparison groups. Lack of consistent diagnostic criteria between RCTs may also have a negative impact on the review. Most RCTS included a short term follow up, hence the systematic review is only adequate to determine short term efficacy of therapeutic taping. Only three out of nine studies have investigated the adverse reactions related to therapeutic taping, other studies did not describe the safety aspects of therapeutic taping application.

Future RCTs should consider improving the quality of the methods in terms of allocation concealments and subject blinding to avoid possible biases. Further studies with appropriate study designs are necessary to determine the efficacy and safety of therapeutic taping as an adjunct to other interventions. RCTs with longer follow-up duration should be conducted to determine the long-term effects of therapeutic taping on PD.

This systematic review indicates that the ETT provides an efficient and safe alternative to pharmacological intervention for PD. This conclusion should be verified through high quality RCTs with larger sample sizes. Future RCTs should be designed with better methodological quality and longer follow-up to establish a firm conclusion on the usage of therapeutic for PD.

Declarations

Author contributions

Study concept and design: AB

Data search: KB

Design of data analysis plan: AB, IK, and IW

Study screening, data extraction and quality assessment: AB, and IK

Analysis and interpretation: AB, IK, and IW

Drafting of manuscript and approval of the final manuscript: AB, IK, IW, and KB

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Competing interests

The author(s) declared no competing interests.

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Figures

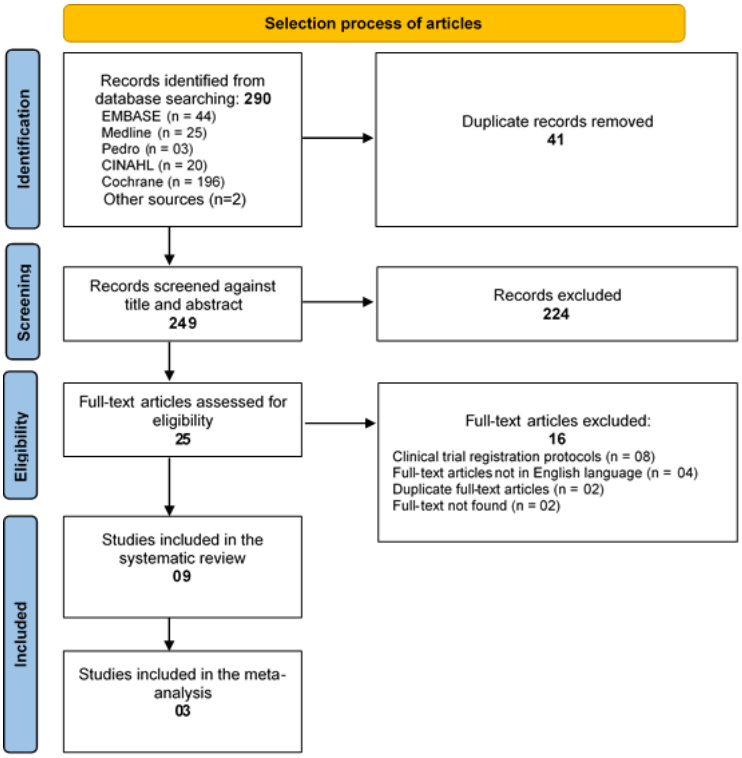

Figure 1

PRISMA flowchart of the study

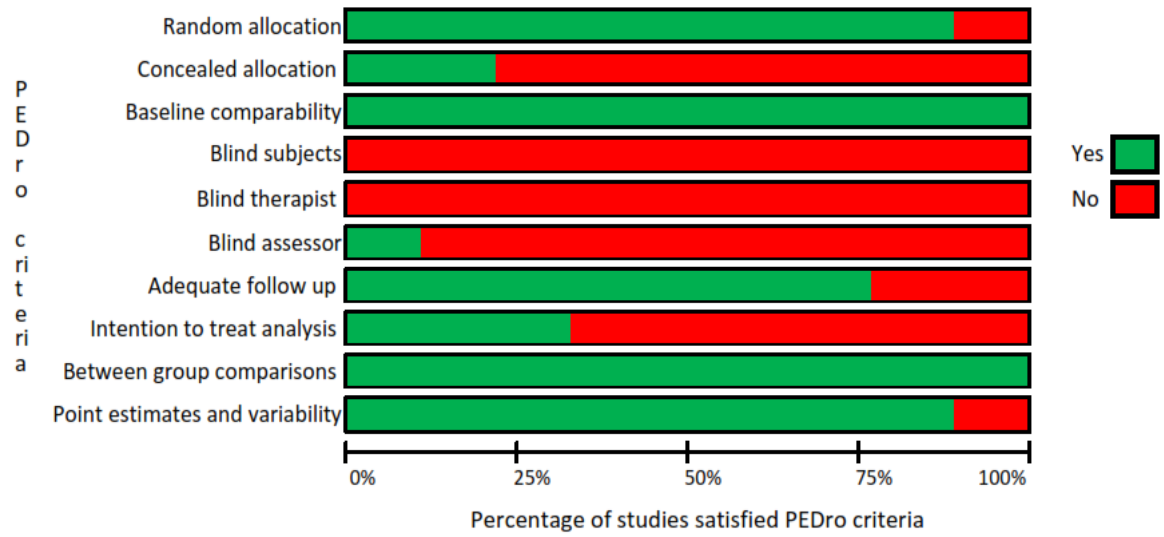

Figure 2

Quality assessment (Pedro Scale)

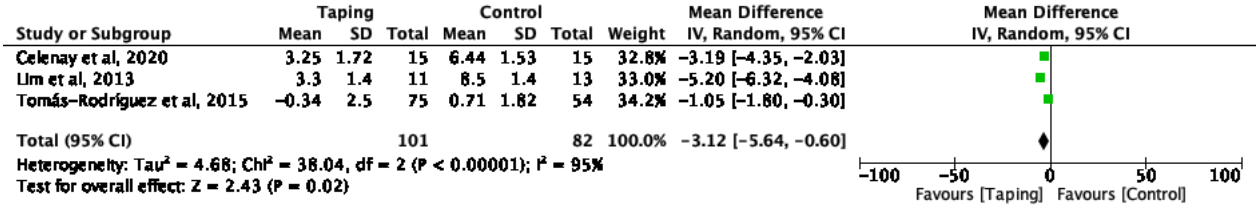

Figure 3

MD (95% CI) of the effect of taping on pain intensity of 183 females with PD as pooled from three studies. CI, confidence interval; SD, standard deviation; MD, mean difference