REVIEW ARTICLE

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A SYSTEMATIC REVIEW ON EFFICACY OF KINESIOTAPING IN PAIN MANAGEMENT

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ABSTRACT

Background: Most common complaint of an individual is pain, which can be with or without injury. It is the key that enables human being to figure out disease ordisorders that is interfering normal life. Pain can be because of numerous reasons but known pathways for pain can be physiological, nociceptive, neuropathic or mixed, which may be experienced as aching pain, burning pain, stabbing pain, etc. Although there are various clinical methods to reduce pain but the main objective of present study was to find if taping can reduce pain be it musculoskeletal or neurological pain. Also to summarise all evaluated work done in various studies.

Methods: various studies have been taken from pub med, Google scholar that includes relief of pain with application of taping irrespective to technique used. Study selection, data extraction, and assessment of methodological quality and clinical relevance were performed independently by two reviewers. All the data extracted from randomised controlled trials included in the review has been used to synthesise the results. Therefore the results are based on facts laid down by the articles included.

Results: Pedro scoring has been used to asses various studies which show the use of taping for relief of pain on various musculoskeletal disorders and neurological disorders.

Conclusions: Although there are various modalities which can help in reducing pain but present review shows that taping can be used as very useful tool for reducing pain. Further it is cheap, less time consuming and easy to manage with excellent results. taping can be used as an adjunct to modalities present to reduce pain.

Keywords: pain, taping, kinesiotaping, adhesive tape, visual analogue scale, physiotherapy.

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INTRODUCTION

The most commonest complaint of an individual with or with injury, with pathology etc is pain. It is the key that enables human being to figure out disease/ disorders that is interfering normal life. Pain is "An unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage" [1], but it stands different in various areas of expertise or specialization as to a neurologist, neurosurgeon it may be the result of neurologic abnormality, an orthopaedist may describe it as musculoskeletal deviation, a psychiatrist or psychologist may find it as an emotional reaction to a physical insult etc [2].

Human body being the complex machine, can experience pain due to multiple reasons but the most common cause in today's scenario is due to musculoskeletal disorders or disease, which involves soft tissue injury, irritation or inflammation which can further lead to functional impairments [2].

Pain can be because of numerous reasons but known pathways for pain can be physiological, nociceptive, neuropathic or mixed, which may be experienced as aching pain, burning pain, stabbing pain, sharp, dull, aching pain, flickering pain, lacerating pain, intense pain, nauseating pain etc [1]. Pain can be further classified on basis of inferred pathology, time course, location, aetiology and guidelines by WHO.

Pathophysiology of pain:

Impulses are generated from noxious stimulus, via peripheral nerves while are further sent to dorsal grey matter of spinal cord. The primary afferent fibres present in dorsal grey matter synapse with interneurons which do one of the three things, Some synapse with motor neurons causing reflex movement (i.e. withdrawing the hand from hot object) while Others synapse with autonomic fibres from sympathetic and sacral parasympathetic system causing autonomous responses like changes in heart rate , blood pressure , localized vasodilatation, piloerection and sweating, further most of the fibres travel a multisynaptic route to the higher centres via the anterolateral tract, from dorsal grey matter these impulses ascend to brain via medulla and midbrain and terminate in thalamus. From the thalamus, the information travels to the cortex [2, 3,4,5,6] (figure 1- pathophysiology of pain).

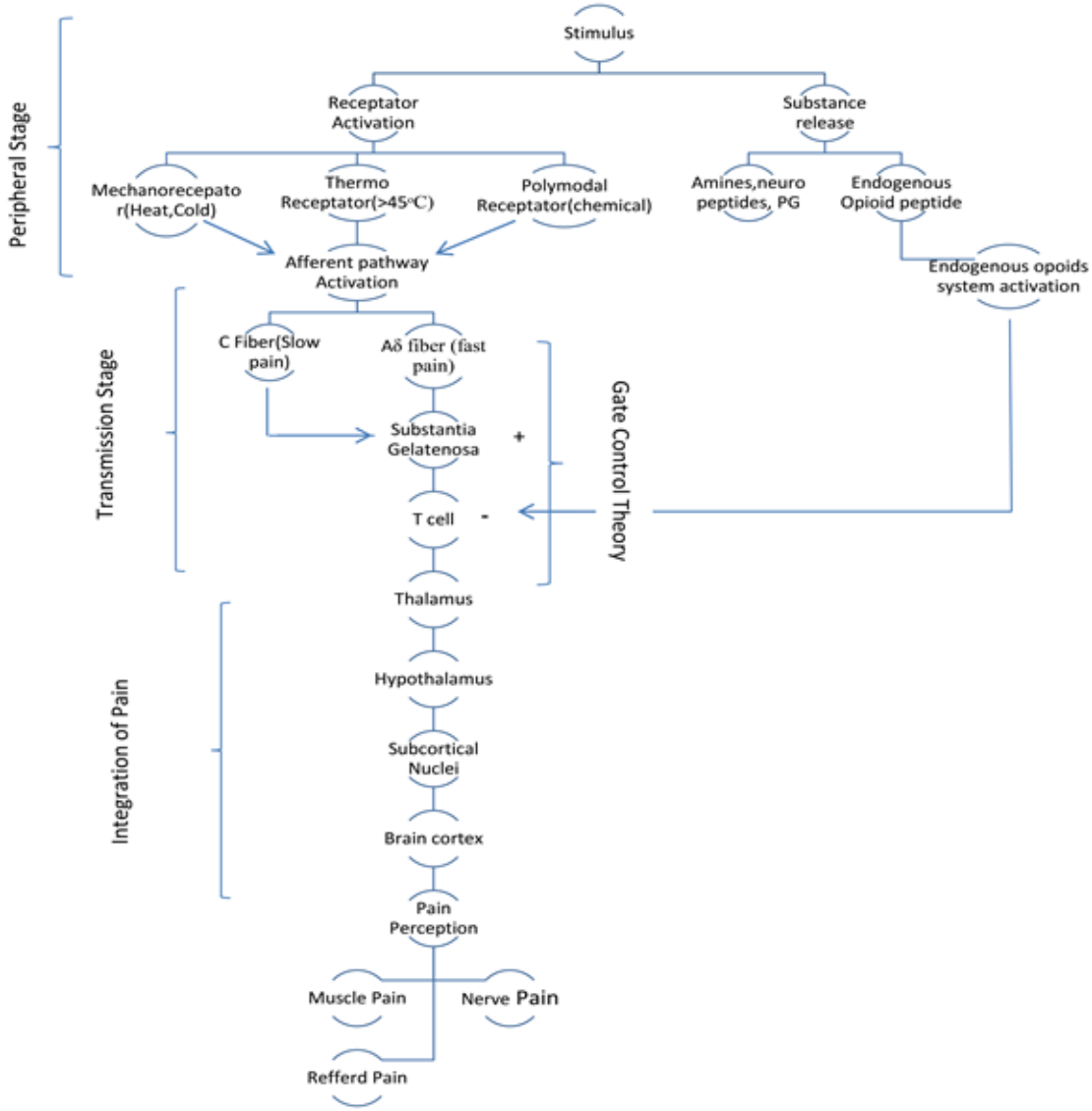

Figure 1: Pathophysiology of Pain

Assessment of pain:

Intensity of pain can be quantified with help of various tools namely Numerical Rating Scale (0= no pain, 10= extreme pain), verbal descriptor scale (no pain, mild pain, moderate pain, severe pain, extreme pain and intense pain), pictorial pain scale/ Wong- baker faces pain, visual analog scale (left side= no pain, right side= most intense pain), Mc Gill Pain Questionnaire (it evaluates location of pain, intensity, temporal qualities and sensitivity to change, as well as sensory and affective aspect of pain) [7] and WILDA Approach, W= words to describe pain e.g. aching, stabbing, I= intensity of pain, L= location of pain, D= duration of pain, A= aggravating/ alleviating factor of pain [8].

Management of Pain:

Medical management for nociceptive pain are NSAIDs, opioids and sodium channel blockers. Anticonvulsants and anti-depressant are also used along with analgesics for neurogenic pain [9].

Physiotherapy management for pain is cryotherapy, Mechanical therapy [Superficial heat (contrast bath, hydro collateral packs, fluidotherapy, heated air, paraffin wax bath) Traction, Compression, Hydrotherapy], Actinotherapy (Infra-red radiation, UV radiation, LASER), Manual therapy (Exercise, Massage, Mobilization, Manipulation, Relaxation, Posture correction, Balancing and gait), Electrotherapy (Faradic current, Galvanic current, TENS, Acupuncture, IFT, SWD, Pulsed SWD, MWD, Phonophoresis, Iontophoresis, Combination therapy, Biofeedback, EMG) Others techniques , Vocational rehabilitation and volunteer activity, Cognitive behavioural therapy, Aroma therapy, Music, Counselling, Body scanning reiki, Occupational rehabilitation, Orthosis, Modified work and Group therapy are also used for pain relief [1].

Taping:

Now a days Various techniques are being used for injury prevention, treatment, and rehabilitation, but whenTapping is applied to soft tissue or joint in acute injury it not only provides support and protection but also helps in minimizing pain and swelling. It reinforces the normal supportive structures in their relaxed position and protects the injured tissues from further damage [10].

Now a days taping can be used to improve pain[11, 12], balance [13], proprioception [14, 15], range of motion[16], functional ability[17] and maintain postural control [18]. Taping can be used for following conditions like ankle sprain [19], plantar heel pain[12, 20] plantar fasciitis[21], anterior knee pain [22], patellofemoral pain syndrome [23,24], shoulder pain[25], shoulder impingement syndrome [26], chronic low back pain [27,28], mechanical neck pain [29], calf pain etc.

METHODOLOGY

Literature search was done by comprehensive computerized search on Pubmed, Biomed central, Google Scholar, Springer link and Oxford Press. Review was performed according to PRISMA.PRISMA statement was published in 2009 in order to set standards in the reporting of systematic reviews and meta-analyses. Step Wise flow diagram of PRISMA is shown in figure 2.Selected articles were evaluated by PEDRO scores and articles which had less than five score on PEDRO were excluded from the review.Search words were 'Pain and Kinesio taping'. We also examined references of these studies and of earlier reviews. Only Randomized controlled trials or Randomized trials were included in the review. Although observational studies and case reports can yield relevant evidence, the main aim of this review was to summarize the results of studies designed to evaluate efficacy of kinesiotaping in pain relief, therefore review was restricted to comparative studies preferably Randomized Controlled Trials.

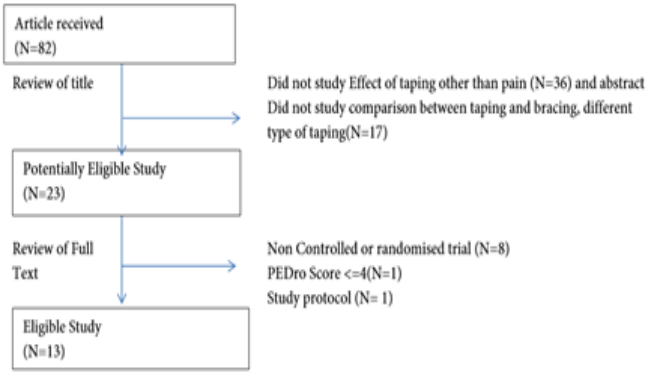

Figure 2: flow diagram according to PRISMA

Search strategy: PubMed, Google Scholar were sequentially searched o identify relevant studies.

Assessment of study quality: Pedro scale, which is an 11 item checklist shown in table I was used to assess the quality of study done.

Data extraction: Study designs, number of participants, participant characteristics and diagnoses, interventions were investigated and method of pain assessments was abstracted.

RESULTS

Search results. Search retrieved 82 unique articles, of which 13 fulfilled the selection criteria. These 13 articles were retrieved from PubMed. No additional eligible studies were retrieved from succeeding electronic database or bibliography searches and pedro scoring have been done table III. The result outcome of all study is that taping is significant in pain relief. The 13 eligible studies are described in Table II.

DISCUSSION

The purpose of this article was to find if taping is effective in reducing pain or not, for these 13 studies were selected from PubMed and Google scholar all randomized controlled trials. In this review the studies included emphasize on use of taping along with either the electrotherapy modalities or exercises. Mark D Thelen et al (2008) concluded in his study titled "The Clinical Efficacy of Kinesio Tape for Shoulder Pain: A Randomized, Double Blinded, Clinical Trial" that KT improves pain free range of motion, decreases pain intensity or disability in shoulder pain [25].

Further taping has been found useful in reducing pain in many other pathologies like plantar heel pain, patellofemoral syndrome, frozen shoulder etc as Joel A Radford et al (2006) and Martin Whittingham, et al (2004) concluded in their studies that taping improves first step pain in plantar heel pain [12]. Martin Whittingham, et al (2004) further reported that, that KT and exercise improves pain in individuals with patellofemoral pain syndrome [23]. For all these study it was concluded that pain is being relieved by taping method either it was used alone or with some modality or exercise programme. The studies included in this review had maximum use of kinesio tape and the most common outcome measure for pain used was VAS(visual analogue scale). The mechanism behind pain relief is that the taping stimulates cutaneous mechanoreceptors which are activates nerve impulses when mechanical load create deformation in form of pressure, vibration, stretch and itch. This activation of cutaneous mehaoreceptorscauses local depolarization that triggers nerve impulses along the afferent fibre travelling towards the central nervous system. Therefore taping may act as mechanical load by creating deformation in form of pressure to the skin or stretch the skin, and this external load may stimulate cutaneous mechanoreceptors causing physiological change in taped area [16].

This traction due to stretching of skin elevates the epidermis increasing pressure on mechanoreceptor below the dermis, thus decreasing nociceptive stimuli and pain decreases$_{29}$. Therefore the review concluded that kinesio tape can be used alone for pain relief especially sports and various biomechanical faults. Therefore we suggest that kinesio tape should be used not only in sports activity but in various clinical set ups as it gives significant results in pain relief.

CONCLUSION

As illustrated in various studies that taping be it adhesive or kinesiotaping are widely being used far biomechanical correction, for relief of pain or for immobilisation. Although there are various modalities which can help in reducing pain but present review shows that taping can be used as very useful tool for reducing pain. Further it is cheap, less time consuming and easy to manage with excellent results.

Table 1: PEDro Scale[23]

1 Eligibility criteria were specified (no points awarded)	Yes	No
2 Subjects were randomly allocated to groups (in a crossover study, subjects were randomly allocated in order in which treatments were received).	Yes	No
3 Allocation was concealed	Yes	No
4 The groups were similar at baseline regarding the most important prognostic indicators.	Yes	No
5 There was blinding of all subjects.	Yes	No
6 There was blinding of all therapists who administered the therapy	Yes	No
7 There was blinding of all assessors who measured at least one key outcome.	Yes	No
8 Measures of at least one key outcome were obtained from more than 85% of the subjects initially allocated to groups.	Yes	No
9 All subjects for whom outcome measures were available received the treatment or control condition as allocated or, where this was not the case, data for at least one key outcome wasanalyzed by “intention to treat.”	Yes	No
10 The results of between-group statistical comparisons are reported for at least one key outcome.	Yes	No
11 The study provides both point measures and measures of variability for at least one key outcome.	Yes	No

Table II: relevant studies describing role of taping in pain									
S.No.	**Author**	**Design**	**No. of Patients**	**Treatment Applied**	**Outcome Measures**	**No of Sessions**	**Follow up**	**Pain Result**	**Other Results**
1.	Joel A Radford et al 2005	Participant Blinded Randomized Trail	92	Low dye taping with Sham Ultrasound, Sham Ultrasound alone	Visual Analog Scale, Foot Health Status Questionnaire	1 session per day	1 week	Improve first step pain, foot pain	
2.	Mark D Thelen et al 2007	Randomized Double Blinded Clinical Trail	42	Therapeutic Kinesio Tape, Sham Kinesio Tape	Shoulder Pain and Disability Index , Visual Analog Scale	2 session	3rd day and 6th day	Decrease Pain Intensity	Improve ROM and Decrease Disability
3.	M Padoni et al 2010	Randomized Single blinded Controlled trial	39	Kinesio taping group, exercise group, kinesio tape and exercise group	Visual Analog Scale, Roland Morris disability Questionnaire	3 times a week for 4 week	4 week	Improve pain	Exercise group reduce disability
4.	Marco Aurelio Nemitalla Added et al 2013	Randomized Controlled trial	148	Guideline endorsed conventional physiotherapy alone, guidance endorsed conventional physiotherapy and kinesio tape	Pain Numeric Rating scale, Roland Morris Disability Questionnaire, global perceived effect scale, Medrisk instrument	10 session for 5 week	5 week, 3 mon, 6 month	Pain improvement	Improve functions
5.	M Encarna-cianAqui-larFerrandiz et al 2013	Double blinded Randomized Clinical trial	120, placebo	Kinesio tape application, plecibo controlled group	Photoplethysmographic measurement, bioelectric impedence, thermographic scanner, visual analog scale, mc gill pain questionnaire	3 times a week for 4 week	1 month	Decrease in venous pain	Improve venous symptom, peripheral venous flow and clinical severity
6.	H R Osborne et al 2006	Double blinded Randomized plecibo controlled trial	31, placebo	Acetic acid then taping, Dexamethasone then taping, placebo group	Pain Visual analog scale assessment, Stiffness visual analog scale assessment	6 session for 2 week	4 week	Acetic acid taping group causing decrease in morning pain	Improve morning stiffness
7	Hassan Shakeri et al 2013	Randomized double blinded placebo controlled trial	30	Standardized therapeutic kinesio tape, placebo neutral kinesio tape	Visual analog scale, standard goniometer	2 session with a 3 day interval	3 day, 1 week	Improvement in pain intensity and nocturnal pain	
8.	Javier Gonzalez Iqlesias et al 2009	Randomized clinical trial	41	Kinesio taping to cervical spine, sham taping	Numeric pain rating scale, neck disability index	1 session	24 hour	decrease pain	Improve ROM
9	Deepti-Asthana et al 2013	Randomized controlled trial	30	Conventional therapy alone, kinesio taping and conventional therapy	Visual analog scale, Roland Morris Disability Questionnaire	1 session per week for 4 week	2 week,, 4 week	decrease pain	Improve ROM
10	Peter Miller et al 2009	Pilot Randomized controlled trial	22	Taping and routite physiotherapy, routine physiotherapy alone	Shoulder pain and disability index, self administered questionnaire including pain and disability, visual analog scale, inclinometer for ROM	3 times per week for first 2 week	2 week, 6 week	Reduction in pain	
11	Martin Whitting-ham et al 2004	Randomized controlled trial	24 men, 6 women	Patellar taping and standardized exercise program, placebo patellar taping and exercise, exercise alone	Visual analog scale, functional index questionnaire	Daily taping and exercise 5 session	2 week, 3 week, 4 week	Pain relief	Functions improved
12	Matthew R Hyland et al 2006	Randomized controlled trial	41	Stretching of plantar fascia, calcaneal taping, control group (no treatment), sham taping	Visual analog scale, patient specific functional scale	1, 3, 4th day	1 week	Relief of plantar heel pain	
13	Marjon Mason et al 2010	Prospective double blind Randomized control trial	41	Infrapatellar taping , quadriceps strengthening, quadriceps stretching, control group	Visual analog scale, cybex 2 dynamometer, goniometer	1 session per day	1 week, 2 week	In isolation stretching and strengthening improve result	

Table III: Quality Scores for eligible Studies												
	PEDro Scale item											
Author (ref)	1	2	3	4	5	6	7	8	9	10	11	Total score
Joel A Radford et al 2005	+	+	+		+		+		+	+	+	8
Melinda M FranettovichSmithetal et al 2014	+	+	+				+	+	+	+	+	8
Mark D Thelen et al 2007	+	+	+				+	+	+	+	+	8
M Paoloni et al 2010	+	+					+			+	+	5
Marco Aurelio Nemitalla Added et al 2013	+		+			+	+	+	+	+		7
M EncarnacianAquilarFerrandiz et al 2013	+	+	+		+	+	+	+	+	+	+	10
H R Osborne et al 2006	+	+		+	+	+	+	+		+	+	9
Hassan Shakeri et al 2013	+	+		+	+	+	+	+		+	+	9
Martin Whittingham et al 2004	+	+				+		+		+	+	6
Matthew R Hyland et al 2006	+	+						+		+	+	5
Javier Gonzalez Iqlesias et al 2009	+	+	+	+	+	+	+	+		+	+	10
DeeptiAsthana et al 2013	+	+		+						+	+	5
Peter Miller et al 2009	+	+					+	+	+	+	+	7
Marjon Mason et al 2010	+	+					+	+		+	+	6

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