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## Research Article

### THE EFFICACY OF NEUROMUSCULAR TAPING ON VARIOUS PAIN PARAMETERS AMONG CHRONIC LOW BACK PAIN POPULATION

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#### ABSTRACT

Neuro Muscular Taping (NMT) is a biomechanical therapy method using decompressive stimuli to obtain positive effects in the musculoskeletal, vascular, lymphatic and neurological systems. As the tapes form wrinkles, lifting the skin, they facilitate venous and lymphatic drainage, improve blood circulation, and relieve pain. Correct application may also assist to correct the alignment of joints, support muscles during movement, and improve stability and posture. In this study we evaluated the effectiveness of a low cost and relatively easy to learn taping technique for the treatment of low back pain which is the most prevalent musculoskeletal condition and the most common cause of disability in developed nations. The lifetime prevalence of LBP (at least one episode of LBP in a lifetime) in developed countries is reported to be up to 85%. LBP results in significant levels of disability, producing significant restrictions on usual activity and participation, such as an inability to work. Furthermore, the economic, societal and public health effects of LBP appear to be increasing. 40 subjects with low back pain were included in this study at the Mekelle University, Ethiopia, Ayder Comprehensive Specialized Hospital, Physiotherapy Department as a part of rehabilitation project to evaluate economic and practical solutions for non specific low back pain in developing countries. Standardized NMT application for lumbar pain was used in one group while the other group received standard physical therapy over a 4 to 6 week treatment period. According to Oswestry Low Back Pain Disability index there was a significant reduction in pain with the NMT lumbar application in comparison to the physical therapy only treatment group. While the Visual Analogue scale showed significant reduction in pain from  $8.2 \pm 1.54$  pretest to  $1.4 \pm 1.09$  post test. The results show that NeuroMuscular taping has an important role in the treatment of non specific low back pain in developing countries due to its low economic cost and the easiness of specific training required to apply correctly the methodology outlined in this article.

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#### INTRODUCTION

Neuro Muscular Taping (NMT) is a biomechanical therapy method using decompressive stimuli to obtain positive effects in the musculoskeletal, vascular, lymphatic and neurological systems. As the tapes form wrinkles, lifting the skin, they facilitate venous and lymphatic drainage, improve blood circulation, and relieve pain. They also correct the alignment of joints, support muscles during movement, and improve stability and posture. The NMT concept has five major functions: Removes congestion of body fluids, activates endogenous analgesic systems, corrects joint problems, muscle support, and

scar treatments<sup>1</sup>. Neuromuscular Taping often provides a solution in difficult situations, in acute stages, and in functional rehabilitation to reduce pain and inflammation. Results can be seen in a wider range of motion, with less pain and discomfort, facilitating the rehabilitation of patients. While most surgical patients go through a waiting period before rehabilitation can start, the NMT treatment protocol can be applied immediately after the surgery to treat hematoma and edema. This cuts down the waiting period by more than half, so patients can start rehabilitation much sooner<sup>2</sup>. Over the last 5 years in Europe proprioceptive NMT technique has become a mainstream treatment protocol in post-operative, oncology, neurological

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care of patients and in sports medicine<sup>3</sup>. This innovative taping application is based on eccentric stimulation of the skin, muscle tissue, tendons, neurological vessels, lymphatic and vascular pathways improving their functioning. NMT provides passive stretching through the application of a tape with eccentric (opposed to concentric) properties encouraging flexibility and coordination and bettering range of movement in patients suffering with excessive muscle contraction due to different clinical conditions. It has been claimed that the effects may be due to the motor sensory and proprioceptive feedback mechanisms. It has been hypothesized that the application of NMT is able to stimulate cutaneous mechanoreceptors. These receptors activate nerve impulses when mechanical loads (touch, pressure, vibration, stretch and itch) create deformation. Their activation by an adequate stimulus causes local depolarization, which triggers nerve impulse along the afferent fibres travelling toward the central nervous system. NMT is a relatively new treatment which induces micro-movements by stimulating receptors in the skin. It is commonly used in the sports traumatology as well as patients with Multiple Sclerosis<sup>4</sup>.

Application of an elastic tape on the skin with a direct therapeutic effect both local and distant by reflex. The application of NMT with an eccentric and decompressive technique rises the skin and dilates the interstitial spaces and consequently improves circulation and absorption of liquids reduces subcutaneous pressure<sup>5</sup>.

Applications of this technique were found in multiple sclerosis<sup>6</sup> and in Cerebral Palsy<sup>7</sup> with encouraging results on gait pattern and upper limb functionality. Results were also found to support the use of this type of taping application to improve the lower-limb functionality in subjects with JHS/EDS-HT<sup>8</sup>. Also a pilot study and case series on sensorimotor deficits in Down Syndrome, the aim is to use motion analysis approach to evidence, in a quantitative way, the biomechanical alterations in a drawing test through the application of NMT: the drawing test permitted the participants to focus their attention on a distal joint, where the contribution of skin receptors in kinesthesia assumes relevance as the muscle spindles usually have<sup>9</sup>.

These study specific application processes of a NMT in specific therapeutic areas it has already been shown a certain improvement in mobility and lymphatic drainage<sup>10-12</sup>. The study was focused on back pain management, quantifying the efficacy of Neuromuscular Taping as a treatment method combined with physical therapy rehabilitation as a means of reducing pain symptoms in Musculoskeletal Pain Syndrome, Back Pain other degenerative conditions of spine. The other aim is to quantify the use of NMT in improving the quality of life of the people.

Low back pain is the most prevalent musculoskeletal condition and the most common cause of disability in developed nations<sup>21</sup>. The lifetime prevalence of LBP (at least one episode of LBP in a lifetime) in developed countries is reported to be up to 85%<sup>22</sup>. LBP results in significant levels of disability, producing significant restrictions on usual activity and participation, such as an inability to work. Furthermore, the economic, societal and public health effects of LBP appear to be increasing<sup>23</sup>. Low back pain is pain and stiffness in the

lower back .it is one of the most common reasons people miss work. Low back pain is usually caused when alignment or muscle holding a vertebra in its proper position is strained<sup>24</sup>. According to World Health Organization, Low Back Pain is responsible for a major portion of people staying away from work or visiting a medical practitioner. It is estimated that 70% to 80% of the world's population has at least one episode of back pain in their life time. This condition may cause a decrease in the quality of life of individuals, as well as deterioration in physical activity. Generally incidents of back pain most commonly occur in between ages 25 and 50 years<sup>25</sup>. In many low income countries especially in Ethiopia lack of knowledge about the effect of physiotherapy services and having an attitude that physiotherapy is giving massage only, results in patients long term disability, dependency and increase in number of handicaps<sup>18</sup>.

The 1994 Ethiopian national population and housing census provides statistics on disability in Ethiopia. This report revealed the total number of Ethiopians living with a disability to be 991,916 or 1.85% of the total population<sup>17</sup>. Of these, 319,181 were physically disabled. It is acknowledged, however, that this census is likely to have underestimated the prevalence of disability in Ethiopia. In 2003, it was estimated that 7.6% of the population were living with a disability<sup>13</sup>.

Other study conducted in Ethiopia suggested that a total of 805492 disabled persons constitute 1.09% of the total population<sup>16</sup>. In addition, during the last twenty five years, the country has been suffering from external and internal conflicts that have precluded major foreign investments. The war-wounded disabled people are estimated at 22,000 persons<sup>17</sup>. War, poverty, ignorance, disease, harmful traditional practice and drought are the major causes of disability in Tigray region. The situation is especially aggravated by post civil war, inadequate nutrition, limited access to health care and absence of educational services, as well as by the high prevalence of harmful traditional practices. The presence of a disability can trap people in a life of poverty because of the barriers disabled people face to taking part in education, employment, social activities, and indeed all aspects of life<sup>18</sup>.

In the recent times the communicable disease has been controlled around the country where as the non-communicable disabling disease are on the raise. Which includes the musculoskeletal and neurological disorders. In order to resolve this situation the health sector is focusing on the healthy life living which includes, healthy eating habits, regular exercises and regular medical evaluation. Thereby the physical therapy and rehabilitation is given priority for effective management. But Lack of knowledge about physiotherapy services specifically NMT directly affect access to get physiotherapy services. Conservative opinion may also influence health and economical status of the family member. Even when physiotherapy services are available, patient's who lack accurate information about the relevant treatment options may not get the service because they do not know they are eligible for the service. In many circumstances where patients are legally entitled to have physiotherapy services especially NMT, are not available for a range of reasons like health system problems (lack of trained providers, concentration of facilities in urban areas, negative provider attitudes, use of inappropriate

or outdated methods, lack of authorization for providers or facilities and cultural and over all poor socioeconomic status. This risky practice leads to increasing morbidity and mortality<sup>19</sup>.

Neuromuscular taping has been used as a therapeutic material in Europe and USA since 10 years back, but it is new to our Hospital and even our country as a whole. Since 6 months back we introduced this new treatment material to Ayder Comprehensive specialized Hospital to help specifically the disabled war veterans and people of Tigray, Ethiopia. In order to apply to the patients this material, throughout the country we planned to measure its efficacy. It is already evaluated in more developed countries, so there is no need of pilot study to obtain preliminary data upon which to base a subsequent pivotal study of the device. The aim of the study is to assess the efficacy of Neuromuscular taping on the treatment of Back pain problems in Ayder Comprehensive specialized Hospital, Physiotherapy Department, Tigray region, Northern Ethiopia, 2015.

## METHODOLOGY

patients diagnosed by Low back pain and receiving treatment of NMT and conventional physiotherapy in Ayder Comprehensive Specialized Hospital and meeting the inclusion criteria were included in the study. The inclusion criteria includes; Patients with chronic lower back pain for at least 6 months, Non specific lumbago causes and Non specific lumbar treatment group, spinal damage such as herniation of the lumbar (L1-L5), degenerative lumbar discopathy, sciatic pain influencing the lower limb, spinal lumbago treatment group. The type of study design is an open-label trial or open trial.

The NeuroMuscular Taping Lumbar MUSCLES (lumbar) protocol was applied following a standard application procedure.

**Features:** Width Cm 5 and Length 30 cm.

**Reference points:** - Intergluteal line - Vertebral column.

**Standard Application procedure:** Patient standing with hands resting on a table, anterior lumbar flexion of 45°. Apply the base of the tape on the interglutea line and laterally 2 cm from the vertebral column. Remove the paper leaving only a small piece to hold the strip. Ask the patient to round the lumbar section (ask to "pull in the belly", the skin over the lumbar area must be stretched). The tape is applied with absolutely no tension. The tape (2) are applied parallel to the column and must end at exactly the same level.

### Study treatment or diagnostic product procedures

The treatment was given twice per week for minimum of 4 weeks and maximum of 6 weeks (8-10 sittings). The cure tape is approved by the FDA and the product name is Tape and bandage, adhesive. The route of administration is over the skin to achieve biomechanical therapy method using decompressive and compressive stimuli to obtain positive effects in the musculoskeletal, vascular, lymphatic and neurological systems. Before the primary neuromuscular taping application VAS (visual analogue scale for pain scaling) and back pain index (Oswestry Low Back Pain Disability Questionnaire) were collected and this procedure was continuing till the end treatment sessions.

### Sample size determination

Total number 40 subjects were included in this study. Simple random sampling technique was used in selection of both controlled and experimental groups and divided into two groups, group A&B with each group having 20 subjects each. Group A is considered to be the experimental group and was selected from the patients in Mekelle University, Ayder Comprehensive Specialized Hospital, Physiotherapy Department who were treated with conventional physiotherapy and Neuromuscular taping. Controlled groups (Group B) were selected randomly from existed patients in Physiotherapy department who were treated with conventional physiotherapy alone. Conventional Physiotherapy treatment includes (TENS, IFT and IRR).

The study proposal has been approved by the college Human ethical committee and written consents were obtained from the study population prior to the study and no human subjects are been harmed during the research.

**Parameters used:** Visual Analogue scale (VAS), Oswestry Low Back Pain Disability Questionnaire (Oswestry disability index ODI)

### Statistical Analysis

Each parameter was computed for each patient before and after the treatment and the effects of the treatment and evaluated using statistical analysis.

### Data Processing and Analysis

Data was anonymously coded and entered into Microsoft EXCEL sheet and exported to Medcalc 16.8 free trial version; using the software and was cleaned and analyzed. Descriptive analysis was performed: for the categorical variables. In addition, percentages, frequencies and other summary statistics were been calculated. The continuous variables normality was checked using box plot graphs. To compare categorical variable with the outcome student-t and upaired-t test were used. Data findings  $P < 0.05$  were considered statistically significant.

## RESULTS

A total of 40 subjects, 22 were male and 18 females (Percentage: M:55%; F:45%) affected with lower back pain who fulfil the inclusion criteria were recruited for this study. The age distribution of the study population was shown in table 1.

**Table 1**

Age (n=40)	Frequency	Percentage (%)
10-20	01	2.5
21-30	14	35
31-40	13	32.5
41-50	05	12.5
51-60	03	7.5
61-70	04	10

In this study, the total subjects were divided into two groups, Group A (Experimental Group) and group B (control group) has 20 patients in each groups and their gender distribution has given in table 2.

**Table 2** Gender distribution in two groups

Groups	Gender	
	Female	Male
A (n=20)	08(40%)	12 (60%)
B (n=20)	10 (50%)	10 (50%)
Total	18	22

Table 3 shows the VAS values as mean  $\pm$  standard deviation and correlation coefficient between two groups and its significance. In group A, the mean pain variable pretest value is  $8.2 \pm 1.54$  and posttest pain value is  $1.4 \pm 1.09$ , which show that the treatment modality used in group A was found to effective, when compared to the group B pretest VAS value is  $7.9 \pm 0.91$  and posttest value  $0.9 \pm 0.64$  which also indicative of effective treatment modality was used in pain reduction. Furthermore, when the Visual analogue scale pain values compared between the two groups (i.e. group A & group B) it was found to insignificant.

**Table 3** Comparison of Visual Analogue scale pain between groups

Variables	Group A (Experiment)	Group B (Control)	P value
Pre test	$8.2 \pm 1.54$	$7.9 \pm 0.91$	NS
Post-test I	$4.75 \pm 0.96$	$5.87 \pm 0.81$	NS
Post-test II	$1.4 \pm 1.09$	$0.9 \pm 0.64$	NS

NS-Not significant

In table 4, The other parameter used in the study is Oswestry Low Back Pain Disability index (ODI). ODI values were expressed in Mean  $\pm$ SD. The result shows a marked variation between the pretest ODI value and posttest ODI value among the groups A&B. To determine the significance of the treatment impact, the correlation coefficient analysis was done between groups and it shown statistically significant ( $P < 0.0001$ ).

**Table 4** Comparison of Oswestry Low Back Pain Disability index (ODI) between groups

Variables (ODI)	Group A	Group B	P Value
Pre test	$46 \pm 10.29$	$43.6 \pm 11.25$	NS
Post-test	$8.85 \pm 5.79$	$15 \pm 4.61$	$< 0.0001$

### Effectiveness of Interventions

After the administration of specific intervention to respective Group, the results obtained are illustrated above which implies, In group A (experimental), the mean pain variable pretest value is  $8.2 \pm 1.54$  and posttest pain value is  $1.4 \pm 1.09$ , which show that the treatment modality used in group A has been found to be very effective in the reduction of pain variable, so it can be concluded as the conventional physiotherapy and neuromuscular taping is effective in reducing pain. Moreover, when compared to the group B (Controlled) pretest VAS value is  $7.9 \pm 0.91$  and posttest value  $0.9 \pm 0.64$  which also indicative of effective treatment modalities was used in pain reduction. But when statically checked with the P Value it showed no significance in group A & B respectively. Furthermore, for a comparison between the groups to find the effective treatment modality, the Visual analogue scale pain values compared between the two groups it was found to insignificant.

In addition, the other parameter used in this study is Oswestry Low Back Pain Disability index (ODI). ODI values were expressed in Mean  $\pm$ SD. The result shows a marked variation between the pretest ODI value and posttest ODI value among the groups A&B. To determine the significance of the treatment impact, the correlation coefficient analysis was done between groups and it shown statistically significant ( $P < 0.0001$ ). So with this result in can be taken as the group A (experimental) is more effective in reduction of disability post back pain and can be considered as a treatment protocol for back pain.

### DISCUSSION

Neuromuscular taping has been used as a therapeutic material in more developed countries; so many pilot studies have already been done on various clinical conditions like pain multiple sclerosis, phantom pain and other systemic problems. In this study, subjects were treated for back pain and followed up for a period of 6-8 weeks.

With a wide ranges of limitations, the result after series of statistical process shows evidence of reduction of parameters pain (VAS) in single blinded comparative study.

In group A (experimental), the mean pain variable pretest value is  $8.2 \pm 1.54$  and posttest pain value is  $1.4 \pm 1.09$ , which show that the treatment modality used in group A has been found to be very effective in the reduction of pain variable, so it can be concluded as the conventional physiotherapy and neuromuscular taping is effective in reducing pain. Moreover, when compared to the group B (Controlled) pretest VAS value is  $7.9 \pm 0.91$  and posttest value  $0.9 \pm 0.64$  which also indicative of effective treatment modalities was used in pain reduction so which implies conventional physiotherapy for back pain is also effective in reducing the pain.

Furthermore, comparison between the groups to find the effective treatment modality, the Visual analogue scale pain values compared between the two groups it was found to insignificant as the P Value showed no significance between group A & B respectively.

As back pain can cause temporary physical disabilities to understand the pattern of disabilities post back pain, Oswestry Low Back Pain Disability index (ODI) was included in this study. ODI values were expressed in Mean  $\pm$ SD. The result shows a marked variation between the pretest ODI value and posttest ODI value among the groups A&B. To determine the significance of the treatment impact, the correlation coefficient analysis was done between groups and it shown statistically significant ( $P < 0.0001$ ). Here by based on the result it can be concluded that the group A (conventional physiotherapy and neuromuscular tapping) is more effective in reduction of disability post back pain and can be considered as a treatment protocol for back pain.

In contrast with NMT application was also shown to be effective as follows, it is noninvasive and is not a time-consuming Procedure; thus, it is cost-effective while not requesting specific patient collaboration. Its hypothetical mechanism of action, if merely speculative, should be that NMT may play a role as a sensitive input that is integrated by the central nervous system and used for assisting motor

program execution process known as sensorimotor integration. It has recently has been hypothesized that taping seems to stimulate cutaneous mechanoreceptors resulting in physiological changes in the taping area<sup>26</sup>, so based on these facts that NMT has some superficial placebo effect on pain reduction in case of back pain.

Moreover, recent study on NMT which concludes that a symptoms of post amputation pain suggested that while using the conventional physiotherapy with neuromuscular taping the pain intensity can be reduced very effectively when compared to the conventional physiotherapy management<sup>27</sup>.

Furthermore we cannot compare our results with other literature results because of lack of research done on this study NMT on back pain. This data report could be considered an observational pilot study with the prospect to inform clinical practice. Further randomized controlled investigations on more subjects are certainly needed to assess effectively the effects of NMT intervention on movement and back pain.

## CONCLUSION

In this study on low back pain and conventional physiotherapy intervention, Oswestry Low Back Pain Disability has been found reducing significantly in experimental group whereas compared to the controlled group. As the disability and the pain factor is reducing, considering the fact NMT can be included as one among the physiotherapeutic modality used for the treatment of Back Pain. Introduction of new intervention such as neuromuscular taping in terms of back pain management itself is a very challenging. The investigation of such studies and their result will help for further research prospective. This study performed on patients with a symptoms of back pain related to neuromuscular skeletal issues suggested that while using the conventional physiotherapy with neuromuscular taping in pain reduction of back pain patient rather individual efficacy of neuromuscular taping is not significant.

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