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THE EFFECT OF KINESIO TAPING IN CHRONIC NON-SPECIFIC LOW BACK PAIN

Degree Programme in Physiotherapy

2016

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May 2016

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Number of pages: 33

Appendices: 4

Key words: Kinesio taping, low back pain, chronic pain

The purpose of this thesis is to find out the effect of Kinesio taping on patients with low back pain (LBP). LBP is the most common musculoskeletal disease affecting all human beings. It effects on activities of daily living (ADL). The aim of this thesis is to determine the effect of Kinesio taping on pain and ADL.

The research subject will be adults from the "Satakunnan Selkäyhdistys" Back Pain Association with chronic LBP. All participants will be interviewed during the first meeting. The amount of pain will be measured with VAS scale during the first session and also checked the level of ADL with The Rolland-Morris Low Back Pain and Disability Questionnaire and with Finnish Questionnaire. The subjects will keep the tape for 5 days. The measurements and interview will be done after 5 days to find out the effect of Kinesio taping on pain and ADL level.

Based on the results, Kinesio tape has positive effect on pain and ADL. In 3 cases the amount of pain decreased, in 2 cases it did not change and in 1 case it increased. The level of activities improved in all cases.

CONTENT

1 INTRODUCTION

Back pain was a medical catastrophe of the 20th century and the legacy reverberates into the new millennium. Pain in the back has always been a common feature of human life. Low back pain takes the second place after the respiratory disease as a cause to visit a physiotherapist. (Waddell, 2004, 1) Pain in the back is extremly common throughout the industrial world, with its high prevalence leading to social and socioeconomic consequences. For example, in Finland, 33% of women and 29% of men reported having had low back pain in the previous month, and 11% of women and 10% of men mentioned being diagnosed or treated by a physiotherapist for the low back pain in the last year. However, the situation with of lumbar pain has not changed over the last 30 years. (Paatelma & Kilpikoski, 2008, 858-63)

Low back pain effects on all human beings. A lot of work companies spend huge sums of money each year on low back pain, the most common cause of job-related disability and a leading reason of missed work. For example, back pain is the second most common musculoskeletal disease in the United States of America. (Website of National Institute of Neurological Disorders and Stroke, 2003) Pain in the back and mental depression are two most common reasons leading to work loss and early retirement. However, natural history of low back pain is often seems to be good, many patients suffer from repeated episodes with consequences for their well-being as well as for their quality of life. (Paatelma, 2011, 11) However, 85% of low back diseases have unknown etiology. (McGill 2002, 6)

2 ANATOMY OF LOW BACK

2.1 Spine and vertebrae

Low back (lumber area) consists of five vertebrae (L1-L5), located between the rib cage and the pelvic. Fibrocartilaginous discs are located between L1-L5 vertebrae region. They protect spinal cord and prevent the vertebrae from rubbing together. L1-L5 are the biggest vertebrae in the spinal column. (Floyd,Thompson & Clem, 2008)

The term “lumbar” which comes originally from Latin word “lumbus” means lion, as it is both powerful and flexible area of the back. The lower the vertebra is located in spine the more it has to bear the weight. L4-L5 are mostly exposed to degradations and injuries. The lumbar vertebrae consist of different parts. Vertebrae body is the anterior part of lumbar vertebrae. It consists of big block of bone. Pedicle is projected from the back of the vertebral body and performs two stout pillars of bone. Lamina comes from each pedicle towards the midline. (Bogduk 2005, 3)

Spinous processes of lumbar vertebrae are short and blunt. Transverses processes are large and blunt. Sizes of intervertebral discs are the thickest (Figure 1). (Tortora & Derrickson 2011, 242)

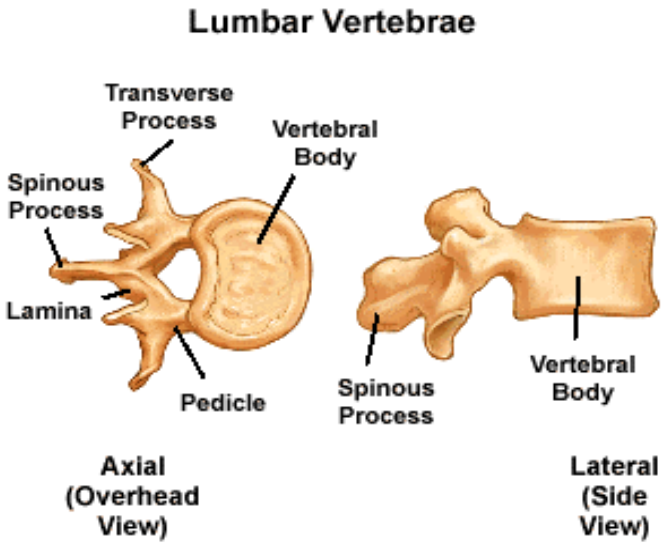

Figure 1. A typical lumbar vertebrae. (Website of Spine Institute, 2015)

2.2 Intervertebral disc

Intervertebral discs are located between vertebraes. Each disc has an outer fibrous ring that is made of the annulus fibrosus (fibrocartilage) and of a nucleus pulpous (elastic, soft substance) (Figure 2). Strong joints are built from the discs. The main purpose of intervertebral discs is to absorb shock and to provide different movements of the vertebral column. Discs contain mostly water and while they are compressed during the day they lose water and become thicker. With age nucleus pulpous becomes harder and loses elasticity. Intervertebral discs are avascular, which means they do not contain blood vessels. Therefore, they rely on blood vessels from vertebrae to get some oxygen and nutrients and get rid of wastes. (Tortora & Derrickson 2011, 234)

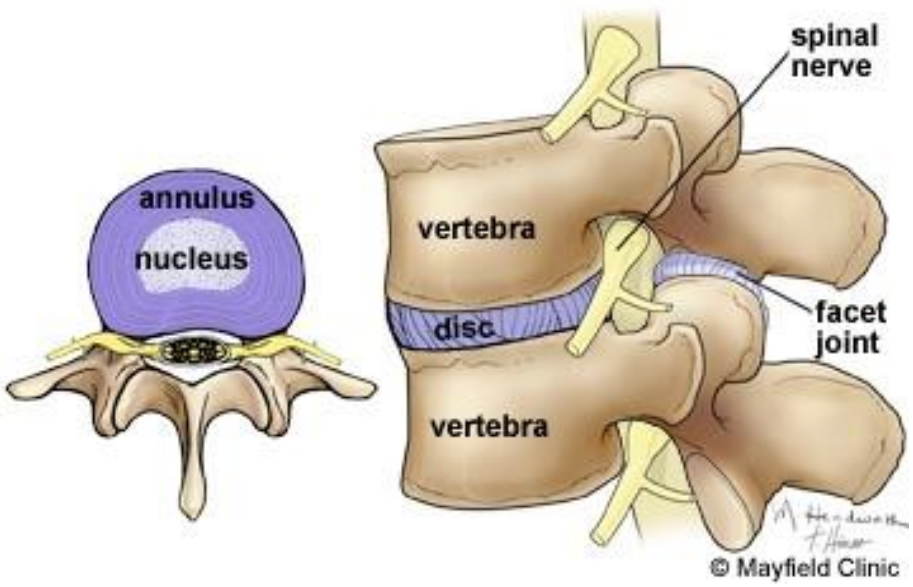

Figure 2. A normal vertebral disc. (Website of Mayfield of Brain and Spine, 2010)

2.3 Ligaments

The ventral surfaces of lumbar vertebrae discs are covered with anterior longitudinal ligament. This ligament is closely attached to the anterior annual disc fibers and it becomes wider when it gets down to the vertebral column. The anterior longitudinal ligament provides stability of the joints and control extension. The posterior longitudinal ligament is located over the posterior surface of the vertebral discs in the vertebral canal. The aim of this ligament is to limit flexion of vertebral column. The supraspinous ligament connects the tips of spinous process of vertebrae from L1-L3. The ligament flavum connect the interlaminar interval (Figure3). This ligament forms the posterior wall of vertebral canal. It provides constant disc tension. The intertransverse ligament attaches to the transverse processes of adjacent vertebrae and does not let lateral bending of the trunk. The iliolumbar ligament starts from the tip of the fifth lumbar transverse process. (Kishner, 2015)

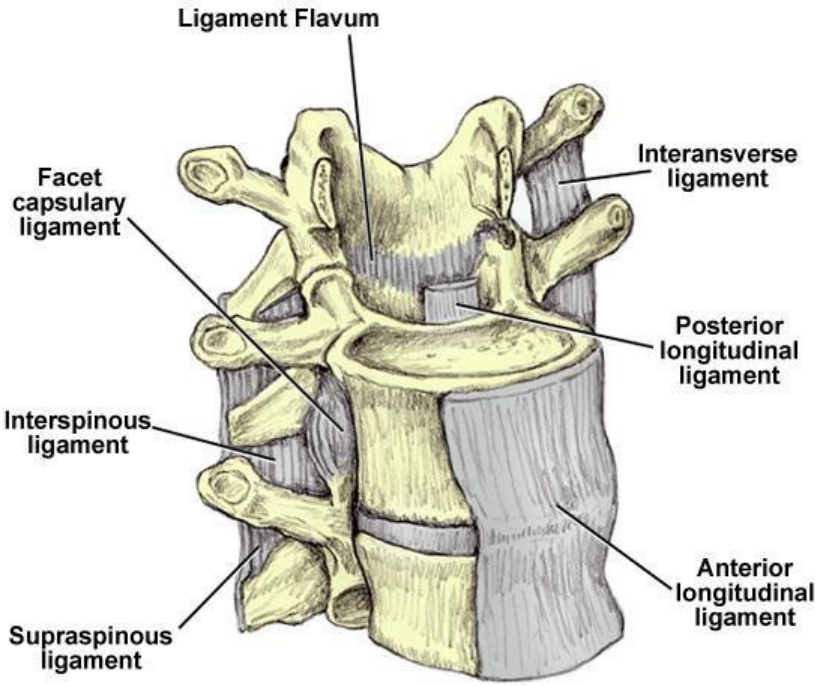

Figure 3. The ligaments of lumbar spine. (Website of MedScape, Lumbar Spine Anatomy, 2015)

2.4 Muscles

Muscles and ligaments work together to control the movement of spine and support it during active and passive phase. There are three groups of lumbar spine muscles, divided according their function and position (Table 1). 1. Psoas major joins to the vertebrae bodies. It is flexor muscle of the hip joint. 2. Quadratus lumborum and the lateral intertransversarii behave as lateral flexors. They cover the transverse process anteriorly. 3. Intertransversarii mediales, interspinales, lumbar erector spinae, multifidi are extensor muscles. They support lumbar spine (Figure 4). (Hansen, Mark de Zee, 2006,1888-1889.)

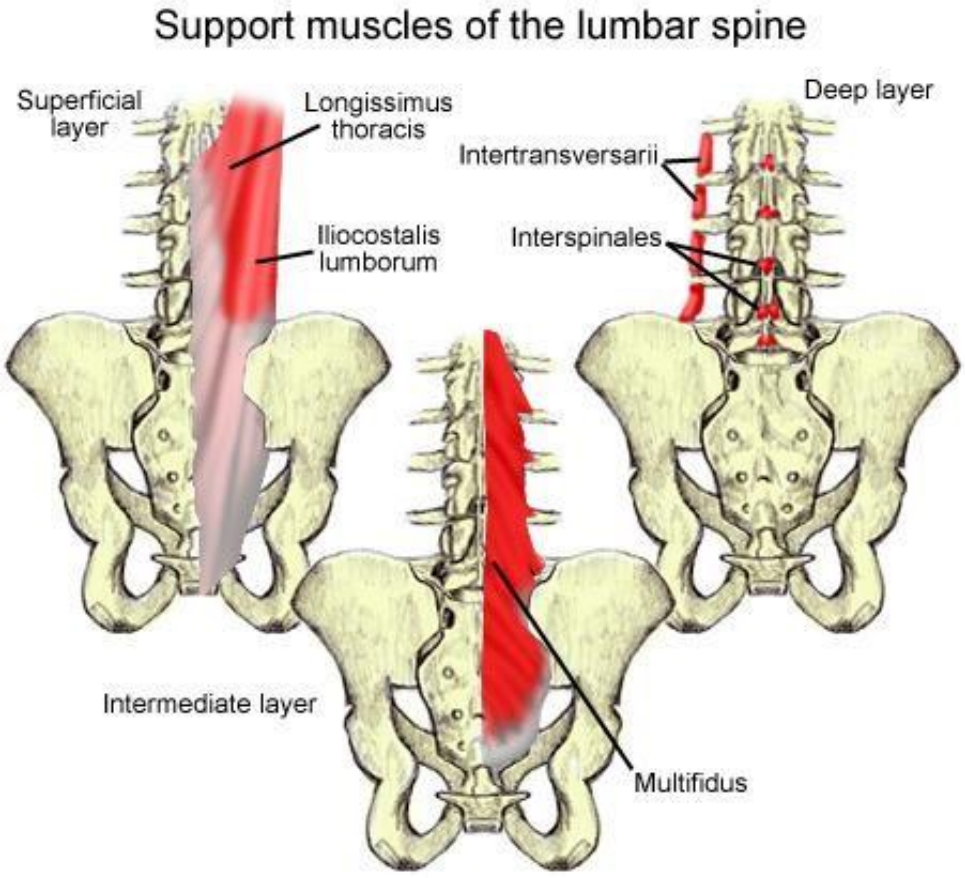

Figure 4. Muscles of the lumbar spine. (Website of MedScape, Lumbar Spine Anatomy, 2015)

Table 1. Lumbar spine muscles and their function by K. Bridwell (Website SpineUniverse).

Muscles of the low back	Function
Psoas major	Flexes: hip joint flexion and vertebral column
Intertransversarii laterales	Lateral flexion of vertebral column
Quadratus lumborum	Lateral flexion of vertebral column
Intertransversarii mediales	Lateral flexion of vertebral column
Interspinales	Extends vertebral column
Multifidus	Extends and rotates vertebral column
Longissimus lumborum	Extends and rotates vertebral column
Iliocostalis lumborum	Extension, lateral flexion of vertebral column, rib rotation

Moreover, the lumbar spine muscles can be classified by layers: deep and superficial. The deep layer muscle are intertansversarii medialis, interspinalis and multifidus. Multifidus muscle plays an important role in stabilization. Spinalis is a superficial muscle, which starts as a thick tendon from the sacrum up to the neck. Abdominal muscles are also important in stabilization of the back (Luomajoki, 2010, 13).

3 NON-SPECIFIC CHRONIC LOW BACK PAIN

Human's spine can be compared with a skyscraper. It defies gravity, and defines people as vertical bipeds. This infrastructure forms the biological machine that secures the kinetic chain and transfers biomechanical forces into the controlled functional activity. The spine works as a channel for the precious neural structures and plays and important role in walking and lifting. Being subjected to the aging, human's spine adapts to the biomechanical loading through compensatory structural and neurochemical changes. Some changes cannot be adapted and that is why they cause pain. (Wheeler &Murrey 2005, 421-52.)

Low back pain can be acute and chronic. Acute low back pain lasts for 6 weeks of less. The pain can be sharp and severe. It might be caused by injury, trauma or disease. However, the pain can be dull sometimes and felt in different areas. This type of pain limits range of motion and daily activities. Chronic low back pain is a low back pain, persisting for 12 weeks or more. The pain is usually deep and dull. It becomes worse while long sitting or lying (Nusbaum, 2012).

According to diagnoses, low back pain can be divided into three categories. The first group is rare and it contains serious low back pain. It is only 1% of all low back pain cases that occur with patients. The second group describes radicular pain that occur because of nerve root irritation. It is only 5% of all low back cases. The last and the main group is a group of non-specific low back that happens in more than 94% cases (Luomajoki, 2010, 21).

Non- specific or nonradical low back pain is defined as low back pain that doesn't belong to any recognizable, known specific pathology (infection, tumor, osteoporosis, ankylosing spondylitis, fracture, inflammatory process, radicular syndrome, cauda equine syndrome) (Paatelma, 2011,14). Low back pain in terms of nonradical or mechanical back pain describes the nature in which the patho-anatomical etiology is not known. It is associated with neurological symptoms or signs (Paatelma, 2011, 15). Generally, the pain is located in the spine or paraspinal areas (or both) and does not radiate into the leg. Moreover, nonradical low back pain is not associated with spinal nerve root compression. (Kerry H. Levin) Non-specific low back pain can be classified into 3 groups according to the time period: acute pain from 0 up to 6 weeks, subacute pain from 6 up to 12 weeks and chronic pain starting from the 12^{th} week (Luomajoki, 2010, 21).

New classification system was set by O'Sullivan (Table 2). According to his work, only 5-10% cases of low back pain are specific. They have clear medical diagnoses. Other 90-95% cases are non-specific. Non-specific group is divided into non mechanical and mechanical (Luomajoki, 2010, 7).

Table 2. Classification of non-specific low back pain by O'Sullivan. (Luomajoki, 2010)

Mechanical non-specific low back pain	Non mechanical non-specific low back pain
1.Movement impairment Directional, hypo mobility and pain. 2.Movement control impairment Directional or multidirectional	"Central maladaptive pain" 1.Yellow flags 2. Physiological factors

Active movement control of the lumbar spine in action is called movement control impairment. Patients with low back pain usually do not have limitation in movement direction but they suffer from sustained postures. Movement control dysfunctions are also known as movement impairment syndromes. Clinically found instability in the lumbar spine and segmental instability can be called as a motor control impairment. These patients can also be described as patients with a postural syndrome. The definition of instability is often used to explain low back pain (Luomajoki, 2010, 8).

Many factors play an important role in the etiology of low back pain. Risk factors can be divided into several groups such as: physical load factors, psychosocial, psychological and individual factors (Paatelma, 2011, 13). There are different factors that influence on low back pain and movement control. It is evidence based that cognitive and psychosocial factors play more important role in chronic low back pain than any anatomical issues (Luomajoki, 2010, 21). Classification of cognitive and psychological factors is presented in Table 3.

Table 3. Classification of cognitive and psychosocial factors. (Website of Dissertations in Health Sciences)

1. Attitudes and beliefs of pain	Patients suffer from fear-avoidance behavior. They believe

	that pain is dangerous and harmful. All this cause movement limitation.
2. Behavior	Limitation or even avoidance of normal activity. Decreased activity level. Avoidance of physical exercises.
3. Compensation issues	Lack of money to return back to work. Insurance costs, delay of income support.
4. Diagnosis and treatment	Lack of professional treatment that lead to positive results. Unclear explanations and unclear diagnosis. Fear of becoming disabled.
5. Family	Overprotective behavior of family members that surround patient.
6. Emotions	Depressive condition due to pain. Fear and anxiety. Loss of motivation and positive thinking.
7. Work	Intensity of previous work, history of work, educational background, psychological atmosphere at work place.

4 THE PHYSIOLOGY OF PAIN

"Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage" (International Association for the Study of Pain: Pain Definitions). Pain is a natural feeling that disturbs human being more or less since the birth till the end of one's life. According to biological origin pain can be physiological and pathological. Chronic pain, being pathological, affects not only the person, suffering from it, but also affects people who surround him or her (Parsons, 1972). Pain is a psycho-physiological response of animals and humans to damage stimuli that causes organic or functional disorders. Pain causes defensive reaction aimed to safe and protect life of any human being. (Kolokolov &Salina, 2014.)

The process of pain can be divided into 4 stages: transduction, transmission, perception, modulation. Transduction starts when the nerve endings are injured and inflammation occurs as a

result. During transmission impulses are sent to dorsal horn of a spinal cord, then to the brain stem and thalamus. During modulation brain can change the sending of further nerve impulses. It can make the release of neurotransmitters more or less. In chronic pain the process of modulation is changed. It does not function correctly. It may cause the reason of producing too much pain on regular stimuli. This phenomenon occurs in chronic pain (Wood, 2008).

According to pathophysiology pain is classified in three groups: nociceptive pain, neuropathic pain, dysfunctional pain. Nociceptive pain is caused by direct tissue damage such as skin, joints, muscles and activation of peripheral pain receptors. The example of nociceptive pain can be myofascial pain. Neuropathic pain occurs in injury affecting the somatosensory nervous system. The example of this type of pain can be sensory abnormalities, such as hyperalgesia. Dysfunctional pain is formed as a result of neural disorders in the central nervous system. The traditional examination of such patients are unable to detect organic disease that could explain the origin of the pain. The main factors contributing to the development of dysfunctional pain is psychological, social problems and emotional stress. (Kolokolov &Salina, 2014.)

Pain can be classified by the intensity (Table 4). Numeric Rating Scale can be used by adults and children (> 9 years old). According to this scale, patients have to describe the pain they are feeling right at the moment (Figure 5). (Webpage of National Institutes of Health Warren Grant Magnuson Clinical Center, Pain Intensity Instruments 2003)

Table 4. Numeric Rating Scale. (Webpage of National Institutes of Health Warren Grant Magnuson Clinical Center, Pain Intensity Instruments 2003)

Intensity	Score
No pain	0
Mild pain	1-3
Moderate pain	4-6
Severe pain	7-10

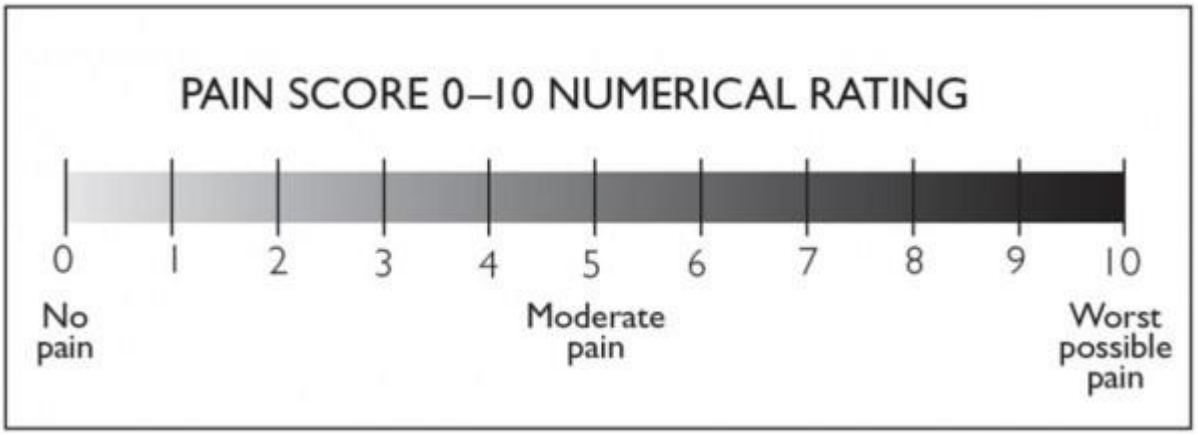

Figure 5. Demonstrates a pain scale. (Website of National Institute of Clinical Studies, Emergency Care Pain Management Manual 2011)

Pathophysiology of nonradicular lumbar pain is usually uncertain. Moreover, non-specific etiology is one of the defining features of this disease. Pain can occur from different sites such as spine, muscles, joints, ligaments or fascia. Any sudden not expected force can cause tearing or rapture, for example after whiplash or lifting heavy things. However, muscle spasm is an essential etiology of low back pain that could be either a cause or effect of back injury, has not been proved. (Kerry&Levin, 2010.)

The concept of Red flags indicates the possibility of serious health conditions that need further medical treatment (Table 5). Red flags were developed for use in acute low back pain. The concept of Yellow flags indicates psychosocial factors that develop risk of long-term disease progression. Yellow flags were developed for use in acute low back pain. However, they can be used more widely to examine the possibility of developing long-term chronic pain Yellow flags describe more the psychological site of the patient and include the beliefs of patient, his or her attitude, motivation etc. Yellow flags play an important role in chronic low-back pain treatment, because they give the whole picture of the medical history of the patient. (Website of Medical Practice Guidelines, Hunter Integrated Pain Service, 2005)

Table 5. Flags concept. (Website of Medical Practice Guidelines, Hunter Integrated Pain Service, 2005)

Red flags	Yellow flags
Major trauma (car accident, falling down accident)	Patient's belief in severity of his/her disease
Minor trauma in elderly or osteoporotic	Low motivation
The age of onset of the disease-less than 20 years old or more than 50 years old	Belief in passive treatment (medical treatment, not an active and physical one)
Medical history: cancer, IV drug use, immunosuppresion	Avoiding physical activity because of pain fear

Bacterial infections and bladder dysfunction	
Constitutional symptoms (high fever, weight loss)	
Progressive or strong sensory changes	

Chronic pain is very common among different people all over the world and the reason for such type of pain is usually unknown. Nowadays researchers found out that the brain plays an important role in a pain process. There are two important areas in the brain: the thalamus and the prefrontal cortex. The thalamus is a gateway between spinal cord and brain centers. If any acute injury occurs, the gateway opens in thalamus, letting the information from the injured part get to the brain. This process makes person with an acute injury to relax and to protect him or herself. This gateway should close after the damaged part is healed. However, in chronic pain the thalamus gateway stays open for a long period of time after acute pain has gone. The volume of the thalamus gets down, leading to a decrease of a neurotransmitter: gamma-aminobutyric acid. The result is that this gateway is always open, every signal becomes more intensive, causing ongoing pain. The prefrontal cortex area controls emotions of a human being and social behavior. It was discovered, that patients, suffering from any chronic pain have the reduction of volume in that region of brain. As a result, people with chronic pain start to feel anxious, depressed and they start to experience fear of pain. (Malcolm&Willis, 2016).

Chronic pain is a pathological process, consisting of specific reactions to pain stimulus. However, those reactions lose the original protective and adaptive nature, as they are used in acute pain. Incorrect reactions in chronic pain cause the disturbance in antinociceptive activity regulation. Chronic pain is a complex overall reaction to damaging effects of environmental factors. This process has metabolic, functional changes, leading to decrease body's adaptability to environmental conditions and limit ability (Kolokolov &Salina, 2014.)

5 KINESIO TAPING

5.1 What is Kinesio taping?

Kinesio tape is an elastic tape designed to support muscles, tendons and ligaments and to decrease pain. Kinesio taping is a part of the kinesiology science. The principle of kinesiology is to treat the muscles in order to help the body be cured naturally by itself. (UKG) Kinesio tape was founded by Japanese Dr. Kenzo Kase in 1973. He set a goal to develop a new method of taping that would not restrict the freedom of movement as a standard tape did. In 1988, at the Olympic Games in Seoul, the World learnt about a new method of Dr. Kase. Later on, Dr. Kenzo Kase founded an International Kinesio Tape Association and the aim of this organization was to find out clinical effects of Kinesio taping and develop new methods and techniques. (Website of Kinesio.UK).

Nowadays Kinesio Tape is widely used all over the world. Kinesio tape is an elastic, adhesive, non-latex tape made from 100% cotton. It is covered with a hypoallergenic acrylic adhesive layer which is activated with a body temperature. Flexibility of Kinesio tape allows to stretch it up to 30-40 % from its original length. It is usually applied with 10 % of stretch. Cotton base of Kinesio tape allows skin to breathe and makes the tape easily tolerated. Elasticity of tape does not restrict range of motions and it helps to support muscles and reduce fatigue. (Website of Kinesiology taping guide).

Dr. Kase together with his colleagues found out several benefits of using Kinesio tape: 1) Improving blood and lymph circulation. Kinesio tape, applied to the skin, lifts the upper layer of skin and creates more space between skin and underlying muscles. More space decreases pressure on lymph channels and produces more area for circulation. It helps release swelling and decrease pain in the injured parts. Moreover, it helps to increase blood flow circulation and as a result, it increases the amount of oxygen and nutrients that are important in the repairing of damaged tissues and removing of waste products when muscles are fatigued. 2) Pain release. Kinesio tape releases neurological and physical the pain by lifting, which decreases the pressure on the pain receptors, located under the skin. 3) Muscle function correction by strengthening the muscle. 4) Provides anatomical support and not limited range of motion. 5) Increasing proprioception. Proprioception improves through the increased stimulation of cutaneous mechanoreceptors. Different methods of

Kinesio tape application can effect on improving joint alignment and can increase the function of a joint by affecting on opposing muscle groups and joint mobility. (Website of Football Medicine, 2010)

5.2 Mechanism of Kinesio taping

Muscle function does not limit body's range of motion and it actively helps blood and lymph circulation. Heart provides blood circulation. However, lymph circulation depends on the skeletal muscle function. The disruption of muscle function causes a number of other symptoms. Therefore, muscle function healing effects on the healing process of injuries. Injured muscle becomes inflammated and swollen. It compresses and reduces the space between the skin and muscle. This leads to a deterioration in the lymph fluid outflow, which is required to remove the waste products of the damaged tissue. This compression effects on pain receptors in dermis (Figure 6) that transmit "signals of discomfort" to the brain. This type of pain is known as myalgia or muscle pain. (Website of Football Medicine, 2010)

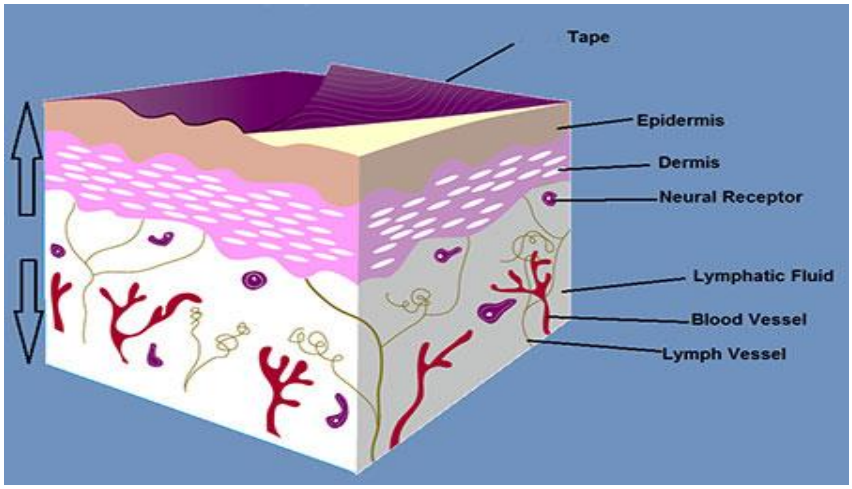

Figure 6. Skin layers representation with the possible mechanic effect of Kinesio taping. (Website of Football Medicine, 2010)

According to a condition of injured area, Kinesio tape can be applied in two ways: unstretched and stretched. Before applying unstretched Kinesio tape, injured muscle and skin should be stretched over. It is necessary to stretch muscles and ligaments of the injured area. After applying unstretched Kinesio tape skin, muscles and ligaments start to contract and return to the original position,

forming skin folds. Thus, the skin lifts over the injured muscle and ligament, giving more space and increasing lymphatic drainage. If the injured muscles and ligaments cannot be stretched, according to trauma then Kinesio tape is applied in a stretched form. Due to its flexibility, Kinesio tape forms wrinkles and support the injured area. (Website of Kinesiology taping guide).

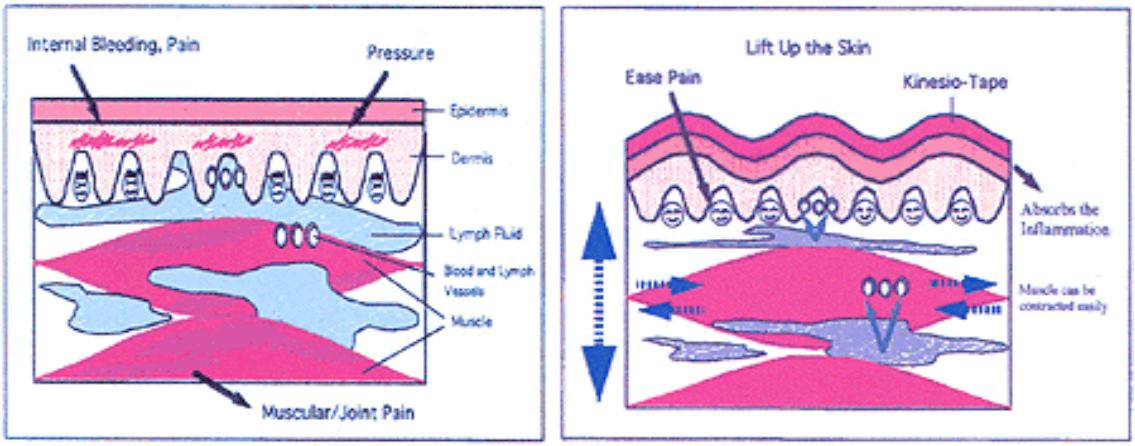

Figure 7. Mechanism of Kinesio taping. (Website of The Fascia Therapy Blog, 2012)

In both forms, stretched and unstretched, Kinesio tape lifts the skin over the injured muscles and ligaments and provides pain relief, supports muscles and improve lymph circulation. The elasticity of Kinesio tape creates more pressure that stimulates nerve receptors, increasing proprioception and decreasing pain (Figure 7). (Website of Kinesiology taping guide).

5.3. Contraindications for Kinesio Taping

Kinesio taping is widely used nowadays. It is simple, cheap and effective technique that may help in different cases. Kinesio taping is very helpful in musculoskeletal conditions. However, there are certain patients with several conditions that may not get benefit from the Kinesio taping. Sometimes the condition might become even worse due to the tape effect. Kinesio tape cannot be applied in several cases. Contraindications are represented in Table 6.

Table 6. Contraindications of Kinesio taping. (Website of Kinesiopiste 2008-2016)

Contraindications for Kinesio taping
1. Deep vein thrombosis
2. Fragile skin
3. Infection (infected local area)
4. Kidney diseases (renal insufficiency)
5. Malignant tumor
6. Open wound area
7. Lymph cysts, fistula
8. Allergy on tape

“Also the following issues should be noted when Kinesio taping is considered: Diabetes, absence of sensation, severe or untreated heart failure, acute asthma, high blood pressure, swelling of internal organs, swelling conduction to the other side of watershed if the side is already swollen or on the skin which is confronted with sustained pressure (lying, sitting)” (Website of Kinesiopiste 2008-2016). In addition, there are certain relative contraindications for using Kinesio taping, however not limited. In some conditions Kinesio taping can be applied but with caution. This conditions include sensitive or thin skin and lymph node removal. If any patient has those conditions, mentioned below, he or she has to contact to the doctor or physiotherapist to get the alternative treatment that suits his/her condition the best (Website of AboutHealth, 2014).

6 ACTIVITY OF DAILY LIVING

Activity of daily living (ADL) are the tasks that one does normally every day such as putting on clothes, brushing teeth and so on. These tasks are tend to be called skills that one learns in early childhood. This term is also used in a healthcare to describe people's activities in connection with instrumental activities of daily living. Doctor Katz set the concept of ADL in 1950 with his co-workers in hospital. ADL are dived into two groups: basic ADL and instrumental ADL (Table 7).

Basic ADL include self-care tasks. Instrumental ADL consist of activities that let a person to live independently. Both ADL and IDAL are important for any human being to perform independent full living (Kernisan, 2010).

Table 7. Basic and Instrumental ADL (Kernisan, 2010).

Basic ADL	Instrumental ADL
Washing the body, brushing teeth	Housework
Feeding yourself (eating)	Shopping
Using toilet	Taking medications
Dressing/ undressing	Cooking meals
Individual hygiene	Transporting yourself (driving, using public transport)
Combing, brushing and so on	Using communication devices

There are different classifications of functioning, diseases, disabilities and health. The International Classification of Diseases (ICD) is used to examine the disease and classify it. ICD is a tool widely used by physiotherapist, doctors and researchers for health management, epidemiology and generalizing health situation among population. The International Classification of Functioning, Disability and Health (ICF) is a tool used for analyzing health and health-related domains. ICF describes health condition or impairment as the effect of body functions and participation influenced by social and environmental factors. ICF views problems with ADL as activity limitation, leading to participation restriction (Figure 8). Moreover, there are different categories for the non-specific low back pain in ICD such as low back pain, lumbago, low back strain, flat back syndrome and etc. ICF has classifications for pain in back (code b28013 Pain in back). For the chronic low back pain ICF uses several codes: b2800 Generalized Pain, b1520 Appropriations of emotion, b1602 Content of thought. (Delitto et.al. … 2012, 2)

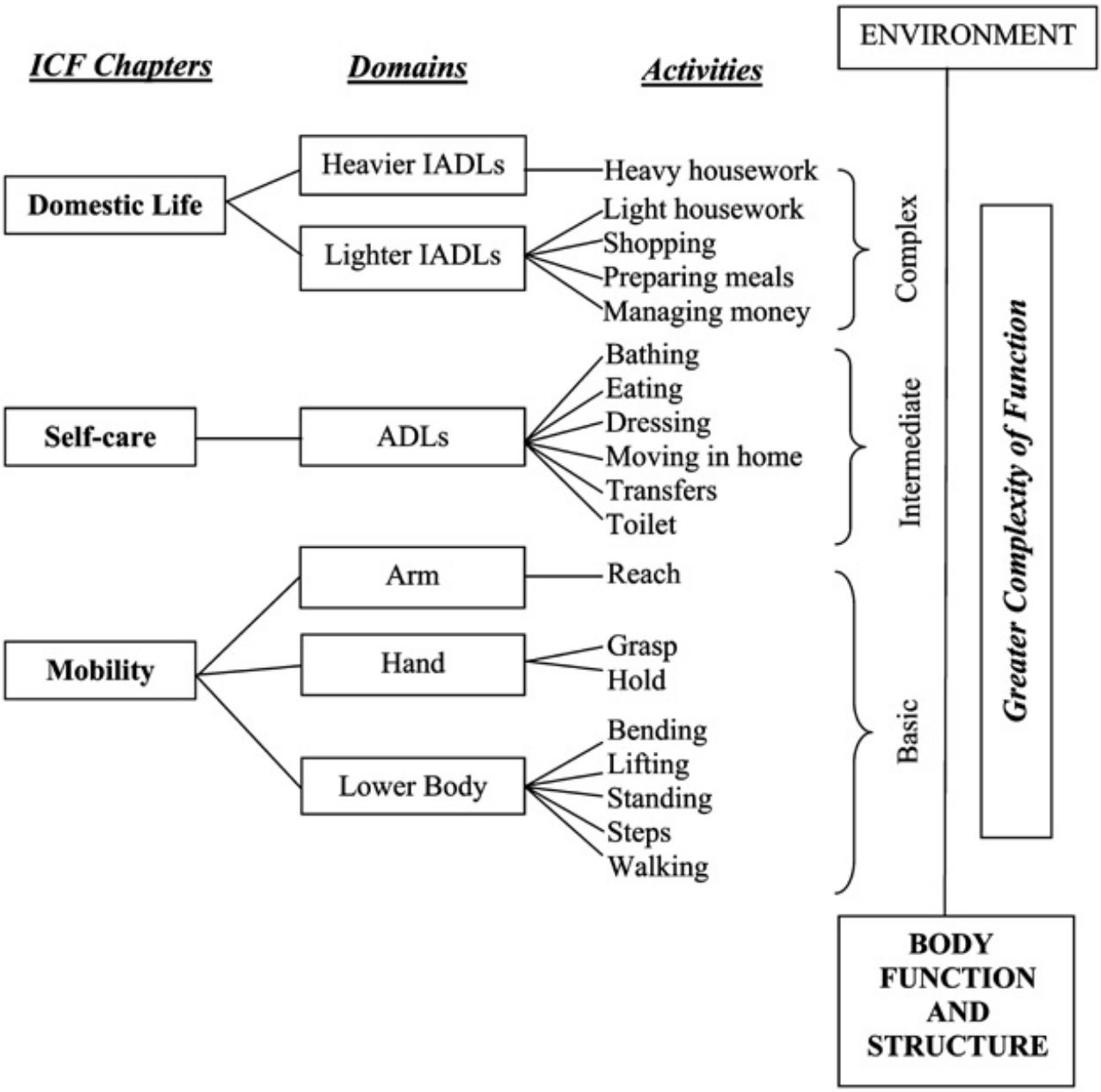

Figure 8. Structure of Core Functions (Website of International Journal of Integrated Care, 2005)

There are different questionnaires used to find out the limitations of ADL in patients with chronic LBP. These questionnaires (Appendix 1) play an important role in treatment management and research. Roland Morris Disability (Appendix 2) questionnaire is widely used among patients with LBP. (Roland&Fairbank, 2010.)

7 PURPOSE AND AIM OF THE THESIS

The purpose of this thesis is to find out the effect of Kinesio taping on patients with low back pain. Low back pain is a common musculoskeletal disease all over the world. Low back pain disturbs activities and decreases level of life. Lumbar pain problem is well known all over the world and there are many researches about this subject. However, Kinesio tape is rather new method in low back pain treatment. The aim of this thesis is to determine the effect of Kinesio taping on pain and ADL. The research subject will be adults from the "Satakunnan Selkäyhdistys" Back Pain Association with chronic LBP. All participants will be interviewed during the first meeting. The amount of paint will be measured with VAS scale during the first session and also checked the level of ADL with The Rolland-Morris Low Back Pain and Disability Questionnaire and with Finnish Questionnaire. The subjects will keep the tape for 5 days. The measurements and interview will be done after 5 days to find out the effect of Kinesio taping on pain and ADL level.

Study question**:**

1. How does Kinesio taping effect on LBP?
2. How does Kinesio taping effect on ADL of patients with LBP?

8 THESIS PROCESS

8.1 Thesis process

Thesis process began in November 2014. The idea of Kinesio taping as a future thesis topic came into my mind during the study process in 2013. The topic was decided in November 2014. Writing process started at the beginning of December 2014. The contract with a client group was signed in January 2015 and the measurement and the interview were held in February 2015. The implementation process went smoothly.

Table. 5 Thesis process schedule.

November 2014	Setting the thesis topics
November 2014	Meeting with a client group at Satakunta Back Association
December 2014	Starting planning and writing a theory
January 2015	Signing the contract with a client-group at Satakunta Back Association
February 2015	Interviewing and measuring the client group 2 times (before taping, and after 5 days after taping)
February 2015- May 2015	Clinical practice abroad (pause break)
September 2015 – November 2015	Writing theory
The end of December 2015 – January 2016	Break
February 2016 – March 2016	Writing theory
April 2016	Analyzing the results
May 2016	Thesis presentation

8.2 Methods

Nine participants men and women with chronic non-specific low back pain from Satakunta Back Association took part in the research process. Nine participants were interviewed in a written form. The amount of pain was measured by VAS scale (Appendix 1). ADL level was measured by the Roland Morris Disability Questionnaire (Appendix 2) and Suomen Kivuntutkimusyhdistys (Appendix 3). All nine participants were taped with a v-shaped technique on 12th of February 2015 (Figure 9). After 5 days the tape was taken off. The client group was interviewed and measured with the same questionnaires. All participants were motivated and eager to take part in the research. Three participants were not able to come because of sickness, so at the end there were only six participants. The youngest client was 56 years old and the oldest client was 70 years old (Figure 10). The average age of six participants was 64 years old. The group consisted of one men and five women. Three participants were retired and three were working. The results were analyzed with Wilcoxon Signed Ranks Test method. This method was chosen because the research had non-parametric population.

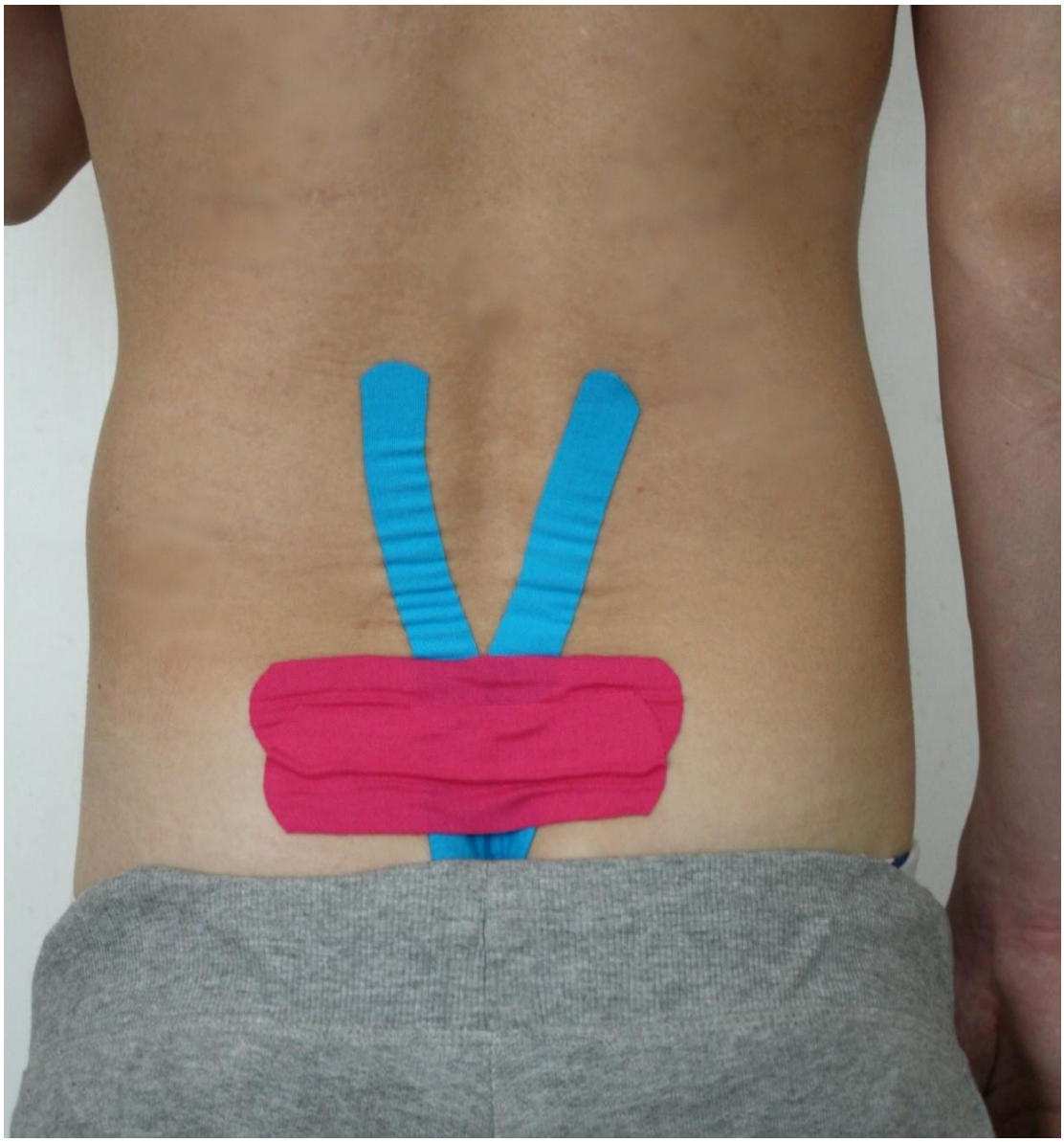

Figure 9. V-shaped Kinesio taping technique. (Own materials)

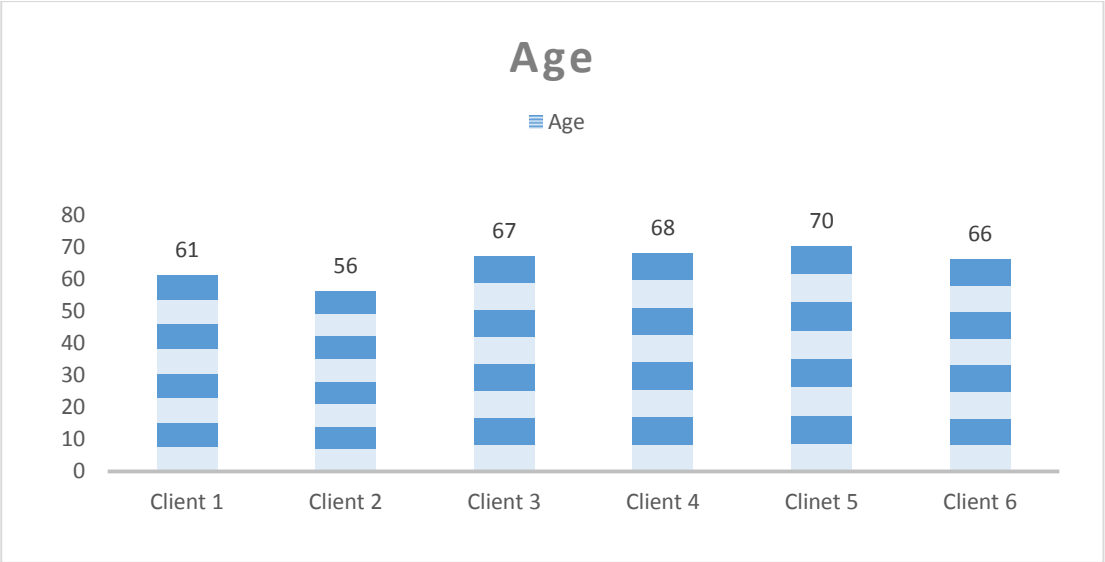

Figure 10. Performance of age value of the researched group. (Own materials)

9 RESULTS

9.1 The effect of Kinesio taping on pain.

The amount of pain has decreased in 3 cases according to VAS scale results (Table 6). In 2 cases the amount of pain didn't change and in 1 case the amount of pain increased. Totally, the results have improved, according to the data. The level of pain has decreased (Table 7).

Table 6. Pre-taping and post-taping VAS results.

Clients	The amount of pain according to VAS results	
	Pre-taping results	Post-taping results
Client 1	VAS - 3	VAS - 3
Client 2	VAS - 7	VAS - 5
Client 3	VAS – 7	VAS - 5
Client 4	VAS - 4	VAS - 4
Client 5	VAS - 4	VAS - 2
Client 6	VAS - 2	VAS - 3

Table 7. Analyze of VAS results with Wilcoxon Signed Ranks Test method.

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Pre-taping	6	4,5000	2,07364	2,00	7,00
Post-taping	6	3,6667	1,21106	2,00	5,00

9.2. The effect of Kinesio taping on ADL of patients with LBP

The Roland- Morris Low Back Pain and Disability score has decreased in 3 cases. In other 3 cases it didn't change (Table 8). The results have improved, because the median score has decreased (Table 9).

Table 8. The results of Roland-Morris Low Back Pain and Disability Questionnaire.

Clients	The Roland-Morris Low Back Pain and Disability Questionnaire Score results	
	Pre-taping	Post-taping
Client 1	Score 2	Score 2
Client 2	Score 11	Score 7
Client 3	Score 7	Score 7
Client 4	Score 13	Score 9
Client 5	Score 5	Score 5
Client 6	Score 12	Score 7

Table 9. Analyze of Roland-Morris Low Back Pain and Disability Questionnaire results with Wilcoxon Signed Ranks Test method.

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Pre-taping	6	8,3333	4,36654	2,00	13,00
Post-taping	6	6,1667	2,40139	2,00	9,00

The results of the Suomen kivuntutkimusyhdistyksen questionnaire showed that in 5 cases the score has improved and in 1 case it didn't change. The first client didn't have any changes. The 2 client had slight limitation in sitting in pre-taping result and in post-taping result there was no limitation in sitting. The third client had moderate limitation in sleeping ability pre-taping result and in post-taping result the client had no limitation in sleeping. The 4 client had moderate limitation in sleeping and dressing up in pre-taping result and in post-taping result the client had slight limitation in sleeping and dressing ability. The 5 client had severe limitation in standing and walking, moderate limitation in sitting and sleeping ability in pre-taping results and in post-taping results the client had moderate limitation in standing and walking ability and slight limitation in sitting and sleeping. The 6 client had severe limitation in standing in pre-taping result and in post-taping – moderate limitation in standing ability.

10 CONCLUSION

Participants reported pain level and ADL level results that were taken before Kinesio taping and were compared with the results that were taken after 5 days of Kinesio taping application. Based on the results, Kinesio tape has positive results. Due to the performed results, the amount of pain has decreased. The Kinesio taping technique effects on ADL activities. Due to the results, it improves

ADL and decrease limitation in different activities.

11 DISCUSSION

I have always been interested in Kinesio taping since I got across with that method at school. I have always thought that this type of tape can be used in different areas of Physiotherapy and not only. It is rather simple, cheap and fast technique that can perform really good results. Although, the effect of Kinesio tape is not fully studied, many physiotherapists believe in it benefits. I have met different clients during my practice in Finland and abroad and more than half of them suffered from low back pain. Low back pain is a common disease all over the world. There are different treatments for that type of impairment. Kinesio taping is one of those treatment. I got an idea to check the effectiveness of such method on clients with non-specific low back pain. After the discussion with the tutor, the topic was set in November 2015.

At the beginning of December 2015, I started to search the information about low back pain and Kinesio tape. It was not very easy because the amount of information was huge but it was hard to find out the data that was needed for the research. I had to check different books, articles, web pages and compare the data, because some of it was not trustable or was too old. The next step was finding a client group for the research. Satakunnan Selkäyhdistys agreed to be a client group and the contract was signed in February 2015. After that, I had to find out what questionnaires I would use in my work, what questionnaires are reliable, fit the research and can provide important data. The search was difficult as the variety of tests and questionnaires is big and does not suit everyone. Finally, the optimal questionnaires were found and after that I've made my research with participants. There were nine participants at the beginning, but during the research three people dropped out due to the sick leave and I got only six results at the end. In my opinion, my results could be better if everyone would have taken part in the research. However, I had to analyze the data what I got.

I had a break off from March till May due to the Erasmus exchange program. I didn't work on my thesis during that period of time. I have returned back to the thesis process in June and then again had a break due to the summer holidays. I continued writing theory in autumn. It was a long and a hard process. Sometimes I had motivation and sometimes not. Practice and school in autumn was loading and it was difficult to concentrate fully on the thesis. The last and the hardest step begun in

February when I was trying to finish theory part. However, at the end on March I've managed it and started analyzing process at the beginning of April. This process was not easy because it included statistical part, which seemed to be problematical for me. However, after some book research I've found a method how to analyze my results and the process went smoothly. Motivation was back again. Thesis presentation was planned to be at the end of May.

To sum up, the whole process went well and smoothly. I got positive results. The mean score between both groups was different as well for VAS as for the Rolland-Morris scale, but the difference was not significant. For the future, I can recommend to take more participants, so the results would be more reliable and significant. In my case, the results have improved but did not have significant effect. This could possibly be because the amount of participants was little. For the future research I would recommend to take around 30 participants or more due to Wilcoxon signed-ranks test recommendations.

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APPENDIX 1

Esitietolomake tutkimukseen osallistuville

Nimi:_____puh._____

Ikä:_____mail_____

Ammatti_____

Kärsitkö teippiallergiasta?

Kyllä En En tiedä

1. Oletko kärsinyt selkä kivusta/jännityksestä? Kyllä En

2. Onko sinulla lääkärin/diagnoosia selän sairaudesta? Kyllä En

Jos on, niin mikä?_____

3. Käytkö oireisiisi jotain lääkitystä (esim kipulääkitys ym) tai muuta hoitoa (esim fysioterapia)?

4. Kuinka kauan selän oireet ovat kestäneet? 1kk-3kk 4kk-6kk 7kk-12kk yli 12kk

Merkitse rastilla oheiselle janalle kipusi voimakkuus tällä hetkellä:

0= ei kipua, 10= sietämätön kipu

0__1__2__3__4__5__6__7__8__9__10

APPENDIX 2

ROLANDIN JA MORRISIN TOIMINTAKYVYTTÖMYYTTÄ KOSKEVA KYSELY

Kun selkänne on kipeä, teidän saattaa olla vaikea tehdä joitakin normaalitoimianne. Tässä luettelossa on lauseita, joilla ihmiset ovat kuvanneet itseään, kun heillä on selkäkipua. Lukiessanne niitä saatatte huomata, että jotkin niistä erottuvat muista, koska ne kuvaavat teitä *tänään*. Kun luette niitä, ajatelkaa itseänne *tänään*. Lukiessanne lauseen, joka kuvaa teitä *tänään*, merkitkää se rastilla. Jos lause ei kuvaa teitä, jättäkää kohta tyhjäksi ja siirtykää seuraavaan lauseeseen. Muistakaa, että merkitsette rastin vain, jos olette varma, että lause kuvaa teitä *tänään*.

		KYLLÄ (1)
1.	Selkävaivani vuoksi vietän suurimman osan ajastani kotona.	
2.	Muutan usein asentoa saadakseni sen hyväksi selälle.	
3.	Kävelen tavallista hitaammin selkävaivani vuoksi.	
4.	Selkävaivani vuoksi en tee mitään sellaisia askareita, joita normaalisti teen kotona.	
5.	Käytän selkävaivani vuoksi kaidetta apunani portaita noustessani.	
6.	Selkävaivani vuoksi asetun makuulle lepäämään tavallista useammin.	
7.	Joudun selkävaivani vuoksi ottamaan tukea päästäkseni ylös nojatuolista.	
8.	Yritän selkävaivani vuoksi saada muita tekemään asioita puolestani.	
9.	Pukeudun selkävaivani vuoksi tavallista hitaammin.	
10.	Olen seisaallani vain lyhyitä aikoja selkävaivani vuoksi.	
11.	Yritän olla kumartumatta tai polvistumatta selkävaivani vuoksi.	

12.	Minun on vaikea nousta tuolista selkävaivani vuoksi.	
13.	Selkäni on kivulias lähes kaiken aikaa.	
14.	Minun on vaikea kääntyä vuoteessa selkävaivani vuoksi.	

15.	Ruokahaluni ei ole selkävaivani vuoksi kovin hyvä.	
16.	Minun on vaikea vetää sukkia jalkaani selkävaivani vuoksi.	
17.	Kävelen selkävaivani vuoksi vain lyhyitä matkoja kerrallaan.	
18.	Nukun huonommin selkävaivani vuoksi.	
19.	Selkävaivani vuoksi pukeudun jonkun muun avustamana.	
20.	Istun paikallani suurimman osan päivästä selkävaivani vuoksi.	
21.	Vältän raskaita töitä kotona selkävaivani vuoksi.	
22.	Olen selkävaivani vuoksi tavallista ärtyisämpi ja pahantuulisempi muiden ihmisten seurassa.	
23.	Kuljen portaita ylös tavallista hitaammin selkävaivani vuoksi.	
24.	Olen vuoteessa suurimman osan aikaa selkävaivani vuoksi.	

APPENDIX 3

Missä määrin vaivanne rajoittaa/rajoittavat

	ei lainkaan	jonkin verran	kohtalaisesti	erittäin paljon
nukkumista	0	1	2	3
kävelemistä	0	1	2	3
seisomista	0	1	2	3
istumista	0	1	2	3
pukeutumista	0	1	2	3
nostamista	0	1	2	3
ihmissuhteiden ylläpitämistä	0	1	2	3
sukupuolielämää	0	1	2	3
vapaa-ajan harrastuksia	0	1	2	3
arjen askareita	0	1	2	3
liikkumista kodin ulkopuolella	0	1	2	3
keskittymiskykyä	0	1	2	3
autolla ajamista	0	1	2	3
työkykyä	0	1	2	3