Saarimaa Pauliina,

Linksmuolis Tomas,

Mäkelä Minna,

Tervala Sanna-Kaisa

The Effect of Knee Osteoarthritis on Functional Ability and Quality of Life in Finnish and Lithuanian elderly women

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LAHDEN AMMATTIKORKEAKOULU
Lahti University of Applied Sciences

LITHUANIAN SPORTS UNIVERSITY

Seinäjoen ammattikorkeakoulu
SEINÄJOKI UNIVERSITY OF APPLIED SCIENCES

SEINÄJOKI UNIVERSITY OF APPLIED SCIENCES

Thesis abstract

School of Health Care and Social Work

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Saarimaa Pauliina, Linksmuolis Tomas, Mäkelä Minna and Tervala Sanna-Kaisa

The Effect of Knee Osteoarthritis on Functional Ability and Quality of Life in Finnish and Lithuanian Elderly Women

Supervisors: Principal Lecturer Merja Finne and Senior Lecturer Minna Mukka

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Osteoarthritis (OA) is the most common joint disorder and one of the leading causes of disability in the elderly. This study focuses on knee osteoarthritis in Finnish and Lithuanian women over 65-years old. The aim of the study is to produce information about knee osteoarthritis` effects on Quality of Life and Functional Ability. The purpose of the information produced by this study is to help physiotherapists and other healthcare professionals to understand better the limitations brought by knee osteoarthritis to a person's life. The present thesis is produced as a part of the Nordplus Joint Education in Bachelor Thesis - project, and it is written in a group of four physiotherapy students: one from Seinäjoki University of Applied Sciences, two from Lahti University of Applied Sciences and one from Lithuanian Sports University.

The measurements of the study were implemented in Lahti, Seinäjoki and Kaunas and composition of the groups were similar in each city. Altogether 27 persons took part in our study group and 28 persons - in our control group. Functional ability was measured with Short Physical Performance Battery (SPPB) and Timed Up and Go-test (TUG). Quality of life was measured with RAND-36 health survey 1.0 - questionnaire. The participants of the study group also filled out a pain diary which included Visual Analog Scale (VAS). The results were analyzed using IBM SPSS v.19 program. Results of our study group participants were compared to reference values of recent studies. Also, the results of study group and control group were compared.

Knee osteoarthritis affects the Functional Ability and Quality of Life negatively. Pain brought by knee OA has a strong effect on person´s functional ability. We found strong correlation between TUG-test and pain ($r > 0,400$) and between SPPB and pain ($r < -0,600$). In these both tests the results were statistically significant, in TUG ($p<0,05$) and in SPPB ($p< 0,001$). Regarding Quality of Life, statistically significant ($p<0,001$) strong correlation was found between pain and physical function ($r<-0,400$), but not between pain and other measured parts of QoL.

Keywords: knee osteoarthritis, functional ability, quality of life, pain, elderly

SEINÄJOEN AMMATTIKORKEAKOULU

Opinnäytetyön tiivistelmä

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Saarimaa Pauliina, Linksmuolis Tomas, Mäkelä Minna ja Tervala Sanna-Kaisa

Polven nivelrikon vaikutus toimintakykyyn ja elämänlaatuun suomalaisilla ja liettualaisilla ikääntyneillä naisilla

Ohjaajat: yliopettaja Merja Finne ja lehtori Minna Mukka

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Nivelrikko on nivelsairauksista yleisin ja yksi suurimmista toimintakyvyn heikentymisen syistä ikääntyneillä. Tämä tutkimus keskittyy polven nivelrikkoon yli 65-vuotiailla liettualaisilla ja suomalaisilla naisilla. Tutkimuksen tavoite on tuottaa tietoa nivelrikon vaikutuksista elämänlaatuun ja toimintakykyyn. Tutkimuksessa tuotettavan tiedon tarkoituksena on auttaa fysioterapeutteja ja muita terveysalan ammattilaisia ymmärtämään paremmin rajoitukset, joita nivelrikko tuo ihmisen elämään. Tämä opinnäytetyö on tehty osana kansainvälistä Nordplus Joint Education in Bachelor Thesis - projektia ja sen on kirjoittanut neljän fysioterapeuttiopiskelijan ryhmä: yksi opiskelija Seinäjoen ammattikorkeakoulusta, kaksi Lahden ammattikorkeakoulusta ja yksi Liettuan Urheiluyliopistosta.

Tutkimuksen mittaukset on toteutettu Lahdessa, Seinäjoella ja Kaunasissa. Tutkimusryhmien kokoonpanot olivat samanlaiset jokaisessa kaupungissa. Yhteensä 27 henkilöä otti osaa tutkimusryhmäämme ja 28 henkilöä kontrolliryhmäämme. Toimintakyky on mitattu SPPB- testistöllä (Lyhyt fyysisen suorituskyvyn testistö) ja Timed Up and Go - testillä. Elämänlaatua mittasimme RAND-36- terveyskyselyllä. Tutkimusryhmän henkilöt täyttivät myös kipupäiväkirjaa, johon sisältyi VAS - jana (Visual Analog Scale). Tulokset ovat analysoitu IBM SPSS v.19-ohjelmalla. Tutkimusryhmän tuloksia on verrattu viitearvoihin aiemmista tutkimuksista. Lisäksi olemme vertailleet tutkimus- ja kontrolliryhmämme tuloksia keskenään.

Polven nivelrikolla on negatiivinen vaikutus toimintakykyyn ja elämänlaatuun. Polven nivelrikosta johtuvalla kivulla on voimakas vaikutus ihmisen toimintakykyyn. Löysimme voimakkaan korrelaation TUG-testin ja kivun ($r>0,400$) välillä sekä voimakkaan korrelaation SPPB:n ja kivun välillä ($r<-0,600$). Molemmissa testeissä tulos oli tilastollisesti merkittävä, TUG-testissä ($p<0,05$) ja SPPB:ssä ($p< 0,001$). Elämänlaadussa tilastollisesti merkittävä ($p<0,001$) voimakas korrelaatio löydettiin kivun ja fyysisen toimintakyvyn välillä ($r=-0,400$). Korrelaatiota ei löydetty kivun ja muiden elämänlaadun ulottuvuuksien välille.

Asiasanat: polven nivelrikko, toimintakyky, elämänlaatu, ikääntyneet

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Used Terms and Abbreviations

ADL	Activities of daily living
FA	Functional ability
ICF	International classification of functioning, disability and health
KOOS	The Knee injury and Osteoarthritis Outcome Score
OA	Osteoarthritis
QoL	Quality of life
RAND-36	RAND-36 item health survey 1.0
SPPB	Short physical performance battery
TUG	Timed up and go
VAS	Visual Analog Scale

1 INTRODUCTION

Life expectancy in Europe is generally higher than in most other areas of the world. Based on perceptions for 2009, a new born male is expected to live on average 76.7 years, while a new born female is expected to live 82.6 years. (Mortality and life expectancy statistics 2012.) We are living longer than before and it is increasingly important to pay attention to our physical condition and quality of life in old age (Guccione 2000,123). Most developed world countries have accepted the chronological age of 65 years as a definition of elderly or older person (World Health Organization 2013).

Osteoarthritis (OA) is the most common joint disorder and one of the leading causes of disability in the elderly. Osteoarthritis affects women more than men, but both genders are affected, while the severity changes increasing with age. (Hanks & Levine 2007, 129.) More than half of people over the age of 65 years report some pain and stiffness due to osteoarthritis and as many as 90 percent show radiographic evidence of the disease. Some degree of physical activity limitations are reported in 20–80 percent of osteoarthritis patients and it has been shown to be an independent risk factor for functional decline. In addition to physical limitations, osteoarthritis can affect psychological well-being. (Parmelee, Harralson, Smith & Schumacher 2007.) Pain and functional impairment are the key domains of the burden of OA patients, and taken together they often exert a significant reduction in Quality of Life (Yildiz et al., 2010, 1599; Boutron et al., 2008, 1026; Van Dijk et al., 2008, 8; Elliott et al., 2007, 1624; Salaffi, Carotti, Stancati & Grassi 2005, 261; Jordan et al., 1997, 1347; Guccione et al., 1994, 356).

This Bachelor Thesis focuses on the knee osteoarthritis in Lithuanian and Finnish women over 65-years old. Purpose of this study is to produce information about knee osteoarthritis' effects to person's life. Aim of the study is to find out how does knee osteoarthritis affect on person's functional ability and quality of life.

This Bachelor Thesis is produced as a part of the Nordplus Joint Education in Bachelor Thesis- project. It has been funded by the Nordplus-programme. The purpose of the Nordplus- programme is to develop cooperations between universities from Baltic and Nordic countries. This bachelor thesis was written in a group of

four physiotherapy students, one from Seinäjoki University of Applied Sciences, two from Lahti University of Applied Sciences and one from Lithuanian Sports University.

2 KNEE OSTEOARTHRITIS

OA changes have been shown with x-ray evidence in the joints of 40–60 percent of the population over the age of 35. This percentage increases with age, reaching as much as 85 percent in those individuals aged over 75. (Atkinson 2005, 167.) Osteoarthritis is classified as a primary OA or secondary OA (Samson et al. 2007,10).

2.1 Prevalence

OA at individual joint sites (notably knee, hip and hand) demonstrates consistent age-related increases in prevalence (Standards of care…2004, 1). However, symptomatic OA is not an inevitable consequence of ageing. Although prevalence of OA rises in frequency with age, it does affect substantial numbers of people of working age. The number of people with OA in the United Kingdom is increasing as the population ages, and as the prevalence of risk factors such as obesity and poor levels of physical fitness also continues to rise. (Osteoarthritis: National Clinical Guideline.. 2008, 4.) According to the United States Centers for Disease Control and Prevention (CDC), an estimated 22 percent of adults (46 million) in the United States have doctor-diagnosed arthritis (Hootman, Bolen, Helmick & Langmaid 2006, 1090). Earlier figures suggest approximately 11 percent of the population 64 years and older to have symptomatic OA of the knee (Manek & Lane 2000, 1795 according to Felson & Zhang, 1998).

In Finland 6,1 percent from over 30 year old men and 8 percent of same age women have knee OA. From women over 75 years old over 32 percent and 16 percent from men of same age are suffering from knee OA. (Polvi- ja lonkka nivelrikko, käypä hoito- suositus 2012.) There are no statistics for prevalence of OA in Lithuania. Symptoms of OA typically begin after the age of 40 and progress slowly, with radiographic evidence of the disease present in the majority of the population by 65 years of age and in approximately 80 percent of the population age 75 years and older. OA of the knee is more common in women than in men,

with risk factors that include obesity, previous knee injury or surgery, and occupational bending and lifting. (Felson 2006, 640.)

The cause of joint pain in OA is not well understood. Estimates suggest that up to 8.5 million people in the UK are affected by joint pain that may be attributed to OA. (AO nation: the… 2004, 1.) Population estimates of the prevalence of joint symptoms depend heavily on the specific definition used, but there is general agreement that the occurrence of symptoms is more common than radiographic OA in any given joint among older people. This may be due to joint pain arising from causes other than OA (for example bursitis, tendonitis) and differing radiographic protocols. (Osteoarthritis: National Clinical Guideline… 2008, 4.)

2.2 Etiology and pathogenesis

OA refers to a clinical syndrome of joint pain accompanied by varying degrees of functional limitation and reduced quality of life. It is by far the most common form of arthritis and one of the leading causes of pain and disability worldwide. Any synovial joint can develop OA but knees, hips and small hand joints are the peripheral sites most commonly affected. Although pain, reduced function and participation restriction can be important consequences of OA, structural changes commonly occur without accompanying symptoms. (Osteoarthritis: National Clinical Guideline… 2008, 3.) Conaghan and Sharma (2009, 7) state, that it is crucial to know the main structures of a healthy knee to understand all the processes of arthritis.

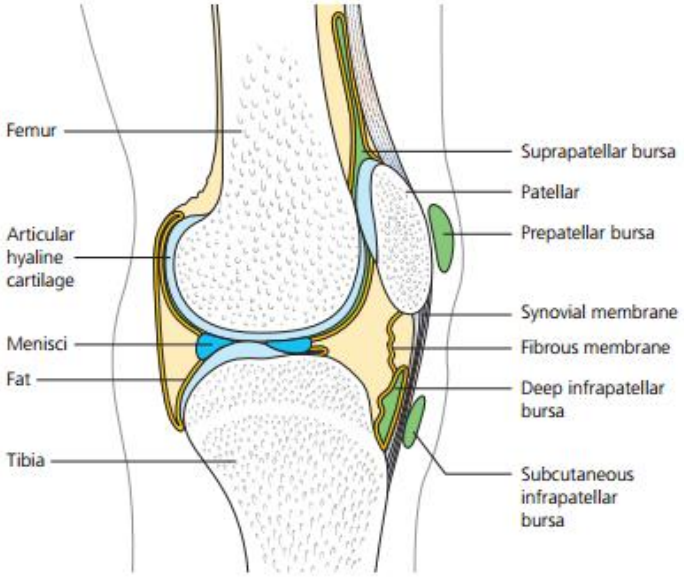

Figure 1 Lateral view of a normal knee joint (Conaghan & Sharma 2009, 7).

The end of each bone in a joint is covered with articular cartilage. Articular cartilage is a specialized type of hyaline cartilage that forms the load bearing surface of joints. (Neumann 2010, 39.) Articular cartilage covering the ends of the articulating bones has a thickness that ranges from 1 to 4 mm in areas of low compression and 5 to 7 mm in areas of high compression (Kurrat & Oberlander 1978, 147). The thickness of cartilage varies between people even at the same spots of the specific joint. Supposedly, it is linked with gender and age. (Conaghan & Sharma 2009, 8.) Similar to periosteum on bone, perichondrium is a layer of connective tissue that covers most cartilage. It contains blood vessels and a ready supply of primitive cells that maintain and repair underlying tissue. This is an advantage not available to articular cartilage. (Neumann 2010, 39.) Hyaline cartilage contains only one type of cells, which are called chondrocytes. Chondrocytes make up to 5 percent volume of the tissue. The biggest part of the cartilage tissue is made of extracellular matrix, which is produced by chondrocytes. (Conaghan & Sharma 2009, 8.)

Articular cartilage distributes and disperses compressive forces to the subchondral bone. It also reduces friction between joint surfaces. The coefficient of friction between two surfaces covered by articular cartilage and wet with synovial fluid is ex-

tremely low, ranging from 0.005 to 0.02 in the human knee, for example. This is 5 to 20 times lower and more slippery than ice on ice, which has a friction coefficient of 0.1. The forces of normal weight-bearing activities therefore are reduced to a load level that typically can be absorbed without damaging the skeletal system. (Mow & Hayes, 1991, 137.)

The absence of a perichondrium on articular cartilage has the negative consequence of eliminating a ready source of primitive fibroblasts used for repair. Even though articular cartilage is capable of normal maintenance and replenishment of its matrix, significant damage to adult articular cartilage is often repaired poorly or not at all. (Neumann, 2010, 40.)

Although OA eventually involves all joint structures, it begins with damage and progressive degradation of articular hyaline cartilage structure and function (chondropenia), typically in a nonuniform, focal manner (Felson, 2006, 638). As chondropenia progresses in localized areas, stress increases across the entire joint, further damaging and eroding cartilage. In areas with full-thickness cartilage loss, abnormal remodeling and attrition of subarticular bone commences, typically accompanied by growth of osteophytes. Synovitis, ligamentous laxity, and periarticular muscle weakness may also occur, eventually leading to joint tilting and malalignment. Malalignment is a risk factor for joint failure, hastening structural deterioration of the joint by increasing local loading forces. (Samson et al. 2007,10.) The OA involves cartilage degeneration, the remodeling of subchondral bone and overgrowth of bone at joint margins. Joint effusion and thickening of the synovium and capsule may also occur. The exact evidence for osteoarthritic lesion of the joint is open subchondral bone where it normally should be covered by articular cartilage. (Conaghan & Sharma, 2009, 9.)

Osteoarthritis may be categorized as primary or secondary. According to the American Academy of Orthopaedic Surgeons (2004), primary OA of the knee can be defined as a process in which articular degeneration occurs in the absence of an obvious underlying abnormality (Samson et al. 2007, 10; according to the Osteoarthritis of the knee…2004). Secondary OA of the knee is often the result of injury (trauma) or repetitive motion such as found in certain occupations. It can also result from congenital conditions and underlying diseases, including include

systemic metabolic diseases, endocrine diseases, bone dysplasias, and calcium crystal deposition diseases. Secondary OA is more likely to manifest itself at an earlier age than primary OA, and may be an initial clue to the presence of a potentially dangerous and treatable systemic disease. While there is rationale for identifying two separate categories of OA, making a distinction between them does not alter clinical practice and therapeutic choices. (Samson et al. 2007, 10.)

2.3 Risk factors

Systemic risk factors include factors such as age, ethnicity, gender and genetic. Increased age is a risk factor to increased incidence of OA in weight-bearing joints (Chaganti & Lane 2011, 100). Study on differences in knee OA between African-Americans and Caucasians report a higher prevalence knee osteoarthritis in African-Americans. (Chaganti & Lane 2011, 100 according to Dillon, Rasch, Gu & Hirsch 2006.) Twin studies have shown a link between genetics and knee OA in women (Spector, Ciccuttini, Baker & Hart 1996, 941). There is evidence that women have higher risk to knee OA than men when aging. Framingham Knee Osteoarthritis Study, a population-based study of osteoarthritis reported, that women have 1, 7 times higher risk of OA of the knee than men. (Chaganti & Lane 2011, 100 according to Felson et al 1995.) Reasons for the difference between men and women are not clear, but it is said that hormonal issues may play a role in the development of OA. (Chaganti & Lane 2011, 100.)

Local risk factors are obesity, previous knee injury and occupational activities. Obesity has been shown to be associated with an increased risk of incident knee OA in several studies. (Chaganti & Lane 2011, 101.) A study from Finland reported strong association with incident knee OA and BMI (Toivonen et al 2010, 311). Same kind of results were reported in the Framingham study; where 598 subjects without OA were found to have an increased risk of incident knee OA if they had a higher baseline BMI (Chaganti & Lane 2011, 101 according to Felson et al 1997). Previous knee injury is also a risk factor for incident knee OA, especially anterior cruciate ligament injury and meniscal resection (Lohmander, Ostenberg, Englund & Roos 2004, 3147; Englund & Lohmander 2004, 2811). Occupations which re-

quire repetitive bending have been shown to be associated with an increased risk of radiographic knee OA. There is not clear evidence that high-level, intense participation in sports increases incident of OA. (Chaganti & Lane 2011, 102.)

2.4 Symptoms and diagnosis

Osteoarthritis diagnosis can include self-reported osteoarthritis obtained from a questionnaire, radiographic definitions of osteoarthritis, and symptomatic osteoarthritis as defined by self-reported joint pain and radiographic evidence of osteoarthritis (Chaganti & Lane 2011, 99). European League Against Rheumatism (EULAR) has established diagnostic criteria for OA of the knee. Symptoms of the patient are recognized as a persistent knee pain, limited morning stiffness and reduced function. Signals are crepitations, restricted movement and bony enlargement. From the radiographic abnormalities osteophytes, narrow intra-articular space, subchondlar sclerosis and subchondlar cysts are signs of knee OA. (Peter et al 2010, 2.) Radiographic definitions are based on Kellgren-Lawrence radiographic classification which grades the extent of radiographic osteoarthritis from 0 to 4, based on the presence and severity of individual radiographic features such as osteophytes and joint space narrowing. (Chaganti & Lane 2011, 99.)

Conaghan and Sharma (2009, 10) say, that OA can influence the life of a person in four dimensions: symptoms, loss of function, limited physical activities and decrease in quality of life. The pain brought by knee OA is usually related to activities such as walking long distances, climbing stairs and getting out of car. Pain in the knee at night express either severe symptomatic disease or pain from causes other than OA, such as inflammatory arthritis, tumors, infection or crystal disease. Morning stiffness is associated with osteoarthritis and it usually lasts less than 30 minutes. Patients often report instability symptoms on their knee. Pain brought by knee OA is most often from patellofemoral joint. Other two areas where the pain emanates are lateral tibiofemoral compartment or medial tibiofemoral compartment. (Felson 2006, 842.)

3 THE INTERNATIONAL CLASSIFICATION OF FUNCTIONING, DISABILITY AND HEALTH

The International Classification of Functioning, Disability and Health (ICF) is a classification of health and health-related domains which was officially approved by World Health Organization (WHO) on 2001. These domains are classified from body, individual and societal perspectives by means of two lists: a list of body functions and structure, and a list of domains of activity and participation. In addition to individual's functioning and disability, ICF also includes a list of environmental factors to the context. (World Health Organization 2001, 3.)

ICF defines different components of health and some health related components of well-being (for example education and labor). Therefore domains contained in ICF can be seen as health domains and health-related domains. (World Health Organization 2001, 3.)

For most of the OA patients pain is the most troublesome symptom (Peter et al 2010, 3). Therefore this study concentrates on pain and how the pain brought by knee osteoarthritis influence on peoples' life and functions. In ICF pain is a part of the body functions and structures. (World Health Organization 2001, 68–70.)

Besides the effects of knee osteoarthritis on person's functional ability, this study also examines person's life in broader perspective. Regarding to bio psychosocial model of rehabilitation, person should be seen as a whole. Quality of life includes parts from body functions and structures, activities and participation. (World Health Organization 2001, 3–6.)

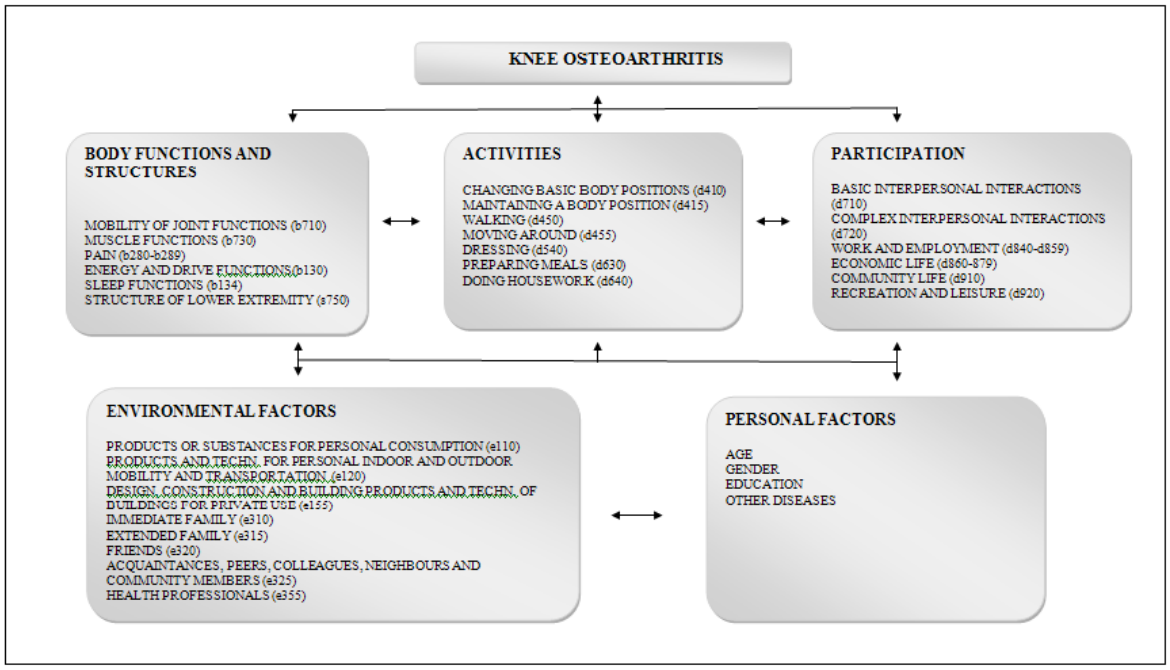

Figure 2 Knee Osteoarthritis in ICF (World Health Organization 2001).

3.1 Pain in Knee Osteoarthritis

International Association for the Study of Pain (IASP) defines pain as “an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage” (Unruh, Strong & Wright 2002, 4 according to Merskey & Bogduk 1994). A problem for the practitioner trying to understand patient’s pain is that pain is a subjective sensation that is colored by the patient’s personal life experiences, and ethnic and cultural background (Mense & Gerwin, 2010, vii).

Pain is a physiological event in the body that is perceived subjectively and individually. Acute pain has a biological function. It is a warning of actual or potential physiological damage. Acute pain usually stops before healing is completed. Chronic pain is often considered as any pain that has lasted more than 3-6 months. (Unruh, Strong & Wright 2002, 4–5). Chronic pain is not simply a sensation, but a global experience, that includes suffering and a distortion of a patient’s role in all phases of life, including family, work and social relationships, and can change the patient’s self perception of himself from being an independent, effec-

tive human being, to being a dependent, ineffective person (Mense & Gerwin, 2010, vii).

For most of the OA patients pain is the most troublesome symptom. In the early stages of OA pain occurs in the joint when patient starts to move and commonly increases as the day progresses. Pain is worsened after prolonged weight-bearing of the joint. In the later stage pain can also be felt while resting and during the night. Pain is usually located in and around the knee. Sometimes it might be located in the upper leg or knee. (Peter et al 2010, 3.) Patients with OA usually avoid moving their painful joints and so the function impairs (Dandy & Edwards 2009, 297). Study by Wilkie et al (2007, 1381) shows that severity of knee pain is associated with an increased likelihood of the study participants to report restricted mobility outside the home.

3.2 Functional ability and Knee Osteoarthritis

The ability to function normally declines with age. This decline is influenced by a host of biological, social and psychological factors. (Guccione, 2000, 124.) According to Bejek, Paroczai, Illyes, Kocsis & Kiss (2006, 13) OA of the knee has an effect on gait adaptations. Statistical differences between patients with unilateral OA of the knee and healthy control subjects were found in cadence, step length, walking base, time of double support phase motion of the knee joint, motion of the hip joint at osteoarthritis side and motion of the pelvis joint.

Muscle weakness in quadriceps muscle is common in patients with OA of the knee. It is presumed to develop because of the minor use of the painful extremity. It is suggested that muscle weakness itself is also a risk factor for structural damage to the joint. (Felson, Lawrence & Dieppe 2000, 642.) OA reduces range of motion in the knee and hip. Restricted joint mobility is associated with high levels of disability. Low range of motion is a risk factor for loco motor disability, such as walking, climbing stairs and getting up from and sitting down the chair. (Steultjens, Dekker, Baar, Oostendorp & Bijlsma 2000, 955–956.) OA patients with poor neuromuscular control of the knee are tend to have bigger functional disability, than the ones with accurate proprioception (Berger, McKenzie, Chess, Goela & Doherty

2012, 261; Van der Esch et al., 2007, 792). Patients with knee OA, high knee laxity or high varus-valgus knee motion and low muscle strength are most at risk of being disabled (Van der Esch et al., 2008, 476; Van der Esch, Steultjens, Knol, Dinant & Dekker 2006, 958).

3.3 Quality of Life and Knee Osteoarthritis

Quality of life is a multidimensional concept. While the term quality implies the degree of excellence of a characteristic, different people may value different areas of life, and therefore quality of life means different things to different people. (Bowling 2003,1–2.) Concept “Quality of Life” includes physical and mental decline, impaired role and social functioning. It includes an individual´s performance of activities that are essential for the continuing functioning of the wider society. (Carr, Higginson, Robinson 2003, 3.) WHO defines QOL as individuals’ perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns. It is a broad ranging concept affected in a complex way by the person's physical health, psychological state, level of independence, social relationships, personal beliefs and their relationship to salient features of their environment. (World Health Organization 1997, 1.)

There is a burden of suffering experienced by people with OA and that burden can be significant. Pain and functional impairment are the key domains of that burden, and taken together they often exert a significant reduction in QOL. (Yildiz et al., 2010, 1599; Boutron et al., 2008, 1026; van Dijk et al., 2008, 8; Elliott et al., 2007, 1624; Salaffi et al., 2005, 261; Jordan et al., 1997, 1347; Guccione et al., 1994, 356).

4 PHYSIOTHERAPY IN KNEE OSTEOARTHRITIS

Even in the absence of a disease, age-related changes in joint function can occur in the elderly (Neumann 2000, 75). OA can be treated conservatively or operatively (Dandy & Edwards 2009, 296). The goal of treating OA is to maintain or improve patient's functional ability and relieve pain (Knee and hip osteoarthritis, Current Care Summary 2012). The treatment of joint impairments in the elderly is based on accurate analysis of the pathomechanics of the affected joints (Neumann 2000, 75). Conservative treatment should include explanation of the condition, advices to keep active by modifying activities and avoid pain and overloading of the joint. Walking sticks and aids are helpful to patients with lower limb OA. Intermittent analgesics and nonsteroidal anti-inflammatory drugs (NSAID's) can be useful and very occasionally intra-articular steroid injections can be used.Operative treatment should be considered only if conservative measures have failed. Physiotherapy is needed to maintain muscle power and joint movement. (Dandy & Edwards 2009, 296–298.) Physiotherapists have an important role being aware of different factors which may lead to arthrokinesiologic changes and understanding when and how physical therapy can diminish the effect these factors have on individual's function and quality of life (Neumann 2000, 75).

4.1 Recommendations

Physiotherapy treatment goals should be a shared process between the patient and the physiotherapists. The goals are defined individually based on the health status and the presence of the barriers and facilitators. The goals are set by using ICF focusing on the limitations of activities and restriction in participation. (Peter et al 2011, 271.) Physical therapy cannot influence the radiographic progression of OA, but it is possible to modify the consequences of this disorder (Peter et al 2010, 4).

United Kingdom has published National Clinical Guideline for Care and Management in Adults concerning OA (Osteoarthritis: National Clinical Guideline… 2008). These guidelines were made by the The National Collaborating Centre for Chronic

Conditions to summarize recommendations for good treatment of OA. It is said that health care professionals should assess OA's effect on the person's function, quality of life, occupation, mood, relationships and leisure activities. People with symptomatic OA should have a periodic reviewed tailored to their individual needs. Formulation of the management plan should be done in a partnership with the patient. Health care professionals should offer advice of core treatments of OA, which are access to appropriate information, exercise and activity and interventions to affect weight loss if overweight. (Osteoarthritis: National Clinical Guideline… 2008, 22.)

The Finnish Physiotherapy Association has collected physiotherapy recommendations for treating knee OA (Kettunen et al 2013). Different physiotherapy methods are used to relieve the pain and maintain or improve patient's functional ability. Both land-based therapy and hydrotherapy are relieving the symptoms of knee OA. Physical treatments, like TENS and ultrasound can be used, but therapeutical training and guiding the patient towards active regular exercise are the most important parts of the conservative treatment. Manual mobilization techniques and muscle stretching are used to maintain and improve the joints range of motion. Aids for moving and being able to perform the ADL-tasks are used, if needed. (Kettunen et al 2013.)

The American Centers for Disease Control and Prevention published A National Health Agenda for Osteoarthritis (2010). These guidelines support Finnish recommendations about exercise as a valuable part of treating OA. Guidelines suggest low impact, moderate intensity aerobic physical activity and muscle strengthening to be important and thus to be promoted for adults with OA of the hip or knee. (National Public Health Agenda for Osteoarthritis 2010, 20)

Exercise is also recognized in The Dutch KNGF Guideline for Physical Therapy in Patients with Osteoarthritis of the hip and knee (Peter et al 2010). However, these guidelines also criticize hydrotherapy for the lack of proper evidence. Nevertheless, it is said, that patients with severe pain can start the exercise in water as a preparation for land-based exercise. Guidelines suggest that exercise program should include muscle strengthening, exercises to increase aerobic capacity, walking exercises and functional exercises. A combination of active and passive exer-

cise therapy is recommended to alleviate the pain and improve physical performance. Manual mobilization considerations are also recommended supporting the Finnish guidelines. Braces and orthoses can be used as well as taping to relieve the pain. Taping should be combined with functional exercise and patient education. (Peter et al 2010, 10–12.)

Osteoarthritis can bring limitations to activities and reduce exercise tolerance and muscle strength, in addition to restricting participation. These are the areas where physical therapists can greatly affect the course of the osteoarthritis of the hip or knee. This type of care prevents further progression or complications of a disorder and improves the patient's self-efficacy. By the conclusion of The Dutch KNGF Guideline for Physical Therapy in Patients with Osteoarthritis of the hip and knee, treatment methods that physical therapists can use for patients with OA includes giving information and advice, supervised exercise, physical modalities and manual therapy. (Peter 2010, 4.)

4.2 Physiotherapy guidelines in the light of research

In recommendations part we have been viewing the guidelines of the OA treatment and physical therapy in Finland, Holland, United Kingdom and America. Guidelines of different countries are made by expert groups and are based on scientific researches and articles written about treatment of osteoarthritis. Exercise has been lifted up to be in major role of treating OA. (Kettunen et al 2012; Peter et al 2010; Conaghan et al 2008.) Jamvedt et al (2007, 131) did an overview about physiotherapy intervention studies for patients with knee OA. Results of the overview supports the guidelines finding a high-quality evidence that exercise improves physical function and reduces pain in OA. Weight loss should be considered if needed. It is shown that person who lost ten or more percent of their body weight had significantly lower function-related pain and improved functional status. (Riddle & Stratford 2013, 19.)

Even though the guidelines are made by experts with the basis of evidence based research, there are still differences between the countries. In Finnish guidelines both land based exercise and hydrotherapy are recognized to relieve pain and

maintain patient's functional ability. (Kettunen et al 2012.) Dutch guidelines differ a bit suggesting to consider hydrotherapy for patients with severe pain as a preparation for land based exercise. Straight recommendation is not written in the Dutch guidelines for the reason of lacking evidences of hydrotherapy as an effective treatment method. (Peter et al 2010.) The effects of exercise in water versus land-based exercise were studied by Silva et al. (2008). Both water and land-based exercise reduced pain and increased knee function (Silva et al 2008). Water exercise advantages are found in the warmth which desensitizes the nerve endings and in the buoyance which reduces the amount of weight going through the joints (Atkinson 2005, 324).

Manual mobilization is recommended in the Finnish guidelines to maintain and improve the range of motion in the joints (Kettunen et al 2012). Dutch guidelines instruct to consider manual treatments (Peter et al 2010). Patients with OA usually avoid moving their painful joints and so the function impairs. When the joints are put through their full range of movement daily, stiffness is avoided and function maintained. (Dandy & Edwards 2009, 297.) Study by Iversen (2012, 36) suggests that exercise combined with manipulation could be more effective than exercise or manual therapy alone.

Physical treatments like TENS and ultrasound can be used according to Finnish guidelines but are not straightly recommended because of the lack of proper evidence of its effectiveness in Dutch instructions (Kettunen et al 2012; Peter et al 2010). Transcutaneous Electrical Nerve Stimulation (TENS) shows moderate-quality evidence to affect the pain. Effects of ultrasound and the use of braces and orthoses were found unclear. (Jamvedt et al 2007, 132–133.) Still both Finnish and Dutch guidelines prefer the use of aids and orthoses if needed (Kettunen et al 2012; Peter et al 2010).

5 NORDPLUS PROJECT

Bachelor Thesis was carried out in the Nordplus Higher Education Programme, as a part of “Development of joint Bachelor Theses in the Nordic and Baltic Physiotherapy Programmes”. The main activities in Nordplus Higher Education Programme are mobility grants for students and teachers, intensive courses for students, teachers learning from each other and networking for developing innovative projects. (About Nordplus Higher Education 2007.)

This Bachelor Thesis process lasted one year. During the year, our bachelor thesis group met three times, once in Estonia, once in Finland and once in Lithuania. Over the year we had weekly meetings in Skype. Written work was processed in Google Drive and Dropbox was used for sharing articles and documents.

Schedule of this Bachelor Thesis process:

April 2012. Nordplus opening seminar in Haapsalu, Estonia. First formulation of the group.

August 2012. Group meeting in Lahti, Finland. Specifying the study area and aim.

September 2012. Changes in group formulation.

October 2012. Planning execution and deciding test measurements.

November- December 2012. Presenting BT-plan. Contacting the possible cooperation partners. Gathering participants. Practising the test measurements.

January-February 2013. Testing the study and control group participants. Writing the theoretical frame.

February 2013. Group meeting in Lahti, Finland. Analysing the results.

March 2013. Writing the theoretical frame.

April 2013. Nordplus ending seminar in Kaunas, Lithuania. Presenting the results.

May 2013. Publication seminars in each school.

6 PURPOSE, AIM AND RESEARCH QUESTIONS

The purpose of this study is to produce information about knee osteoarthritis` effects on a person's life. With that information we want to help physiotherapists and other healthcare professionals to understand better how the knee OA affects a person`s physical, social and mental side of living. When understanding better the limitations brought by the knee osteoarthritis to a person`s life, health care professionals are able to make the treatment more effective and fulfilling. The aim of the study was to find out how does knee osteoarthritis affect a person's functional ability and quality of life. Another aim was also to find an answer to the question how the pain intensity influences functional ability and quality of life.

Our research questions were:

1. How does knee osteoarthritis affect functional ability?
2. How does knee osteoarthritis affect quality of life?
3. What effect does the intensity of pain brought by knee osteoarthritis have on persons' quality of life and functional ability?
4. How does quality of life and functional ability vary regarding people with knee osteoarthritis compared to people without knee osteoarthritis in this study?

7 EXECUTION AND METHODS

Quantitative research deals with numbers and relationships between them. Like in every research form, the process starts with establishing the research problem and converting it into research questions. Questions are used to collect material to solve the problem. The results are interpreted in accordance with statistical rules, followed by a report in which the research problem is solved. To be able to carry out quantitative research calculations, it is needed to know what is calculated and what the object is. (Kananen 2011, 72–73.)

7.1 Execution

This Bachelor Thesis was carried out in cooperation with Nordplus- partners from Kaunas, Lahti and Seinäjoki. The plan was to find a minimum of 30 people with diagnosed knee OA, ten from each city. The purpose was also to find a control group of 30 people without knee OA to compare them to the study group. Both groups were collected with the help of the collaborating working field partners.

Study group inclusion criterias were female gender, age over 65 years, radiographic knee osteoarthritis (diagnosed by a doctor), experience of pain in the knee for at least three months, ability to perform the ADL-tasks and to live at home, ability to follow instructions and walk with or without a walking aid. Considering the fact that this study was focusing on the knee osteoarthritis and knee pain, the strongest pain had to be in the knee area.

Exclusion criterias were lower extremity replacement, other rheumatic diseases and doctor’s prohibition to exercise.

Control group inclusion criterias were female gender, age over 65 years, ability to follow instructions, ability to perform the ADL-tasks and to live at home and ability to walk with or without walking aid.

Control group exclusion criterias were lower extremity replacement, knee OA or other rheumatic disease, chronic pain and doctor's prohibition to exercise.

Participants filled out a preliminary form (APPENDIX 1 and 2) to ensure the suitability for our study. Eventually we found 27 people with diagnosed knee OA, ten from Kaunas, nine from Lahti and eight from Seinäjoki. In the control group we had a total of 28 people, ten from Kaunas, ten from Lahti and eight from Seinäjoki. We measured pain, functional ability and quality of life of the study group and functional ability and quality of life of the control group.

The instrument for measuring pain was a pain diary. Functional ability was measured by using two different tests, which were Timed Up and Go test (TUG) and Short Physical Performance Battery (SPPB). Quality of life was measured with RAND 36- item health survey 1.0 (RAND 36). Describing tool of the study group was the Knee injury and Osteoarthritis Outcome Score (KOOS). Every participant filled the health questionnaire form before testing to ensure participants safety during the testing. The Health questionnaire (APPENDIX 3) is a part of the ALPHA-FIT Test Battery for Adults Aged 18–69 (Suni, Husu & Rinne 2009). There is an official translation of the Finnish survey but the Lithuanian version was translated by us.

The tests were carried out during the time between 10–12 a.m. Testing of one study group person took approximately 45 minutes and for one control group person about 30 minutes. During one testing day, we were able to test 3 to 4 people. The testing order in the study group was: pain while testing day with VAS-scale, KOOS-questionnaire, RAND-36-questionnaire, SPPB and TUG. In the end of the test the study group participants were instructed how to fill out the pain diary. Order with the control group was: RAND-36, SPPB and TUG. Prior to the study ALPHA-FIT-health questionnaire was used**.** Study group participants returned the pain diaries by mail.

7.2 Research methods

The tests were chosen because of being international, reliable, valid and easily repeatable. Also, the tests we used were officially translated to Lithuanian and Finnish languages. Functional tests were chosen because they measure functional ability of elderly people and are used in several knee osteoarthritis studies.

The Short Physical Performance Battery (SPPB) (APPENDIX 4) is one of our measuring tools for functional ability. SPPB is well established and a common test for assessing lower extremity function of elderly people. The performance of lower extremities will define elderly people's functional ability; with higher scores indicating better lower body function. It is related to disability and activities of daily living (ADL). The SPPB is composed of three tasks: a hierarchical balance test, a four meter walk at the usual speed and five repetitive chair stands. (Guralnik et al. 1994, M86.) The test is valid and reliable (0,83–0,89) in diverse populations. (Freire et.al. 2012, 870). Studies show that OA reduces range of motion in the knee and hip. Restricted joint mobility is associated with high levels of disability. Low range of motion is a risk factor for locomotor disability, such as walking, climbing stairs and getting up from and sitting down the chair. (Steultjens, Dekker, Baar, Oostendorp & Bijlsma 2000, 955–956.) Therefore we chose SPPB to our study it measuring walking and getting up from chair.

Timed up and go test (TUG). (APPENDIX 5) TUG gives an answer to basic mobility skills of elderly people. The test also predicts a person´s risk of falling. It is a quick test and requires no special equipment. The test is reliable and valid for quantifying functional mobility. Test includes the patient getting up from a chair, walking three meters, turning and returning to sit. (Podsiadlo & Richardson 1991, 142.) There is also a good relationship between gait time and TUG in elderly orthopedic rehabilitation population (Freter & Fruchter 2000, 99). It is shown that osteoarthritis has effects on gait parameters and walking speed and that is why we chose TUG to measure functional ability in our study (Bejek et al., 2006, 13).

The RAND 36- item health survey 1.0 (RAND 36) (APPENDIX 6) is widely used health-related quality of life (QoL) survey instrument in the world today. The questionnaire is divided into eight health concepts: physical functioning, bodily pain, role limitations due to physical health problems, role limitations due to personal or emotional problems, emotional well being, social functioning, energy/fatigue and general health perceptions. (Hays & Morales 2001, 350.) Pain and functional impairment are the key domains of the burden carried by OA patients and taken together they often exert a significant reduction in QOL (Yildiz et al., 2010, 1599; Boutron et al., 2008, 1026; van Dijk et al., 2008, 8; Elliott et al., 2007, 1624; Salaffi et al., 2005, 261; Jordan et al., 1997, 1347; Guccione et al., 1994, 356). RAND-36 can be used in health studies to determine the impact of chronic diseases (Aalto, Aro & Teperi 1999, 5) and was therefore a suitable measure for quality of life in our study. RAND 36-item health survey is translated to Finnish and Lithuanian. Both versions are reliable (0,80–0,94) and valid as a measure of the health-related quality of life. (Aalto, Aro & Teperi 1999, 51; Furmonavicius & Petkeviciene 2002, 1225).

Pain diary. (APPENDIX 7) For most of the people pain is the most troublesome symptom in OA (Peter et al 2010, 3). Therefore it was important to measure the pain in our study. The study group filled a pain diary for five days. Test persons marked their experienced pain every morning while resting and while moving. Pain was marked using Visual Analog Scale (VAS). VAS has been developed to measure pain. (Scott & Huskinsson 1979, 560.) In our study VAS-scale assesses chronic pain. It is a ten centimeter long horizontal line by word descriptions at both ends. The patient marks the point on the line that they feel represents their perception of their current state. The VAS score is determined by measuring millimeters from the left side end of the line to the point that patient marks. (Paul-Dauphin, Guillemin, Jean-Marc & Briacon 1999, 1117.) VAS is valid and reliable tool for measuring pain (Bijur, Silver & Gallagher 2001, 1153-1155). To get more reliable facts about pain caused by knee osteoarthritis, we examined pain for more than one day.

The Knee injury and Osteoarthritis Outcome Score (KOOS) (APPEDIX 7) is a specific instrument to assess people´s opinions about their knee and related prob-

lems. The KOOS is intended to be used in secondary or primary knee osteoarthritis. With KOOS we gathered more specific information from our study group and about the severity of knee osteoarthritis. The KOOS evaluates both short-term and long term consequences of knee problems. It is divided into five different subscales; pain, other symptoms such as swelling, restricted range of motion and mechanical symptoms, function in daily living (ADL), function in sport and recreation and knee-related quality of life. (Roos & Lohmander 2003, 3.) The KOOS is valid, reliable and responsive self-administered instrument (Alviar et al., 2011, 578). The survey is translated into Lithuanian and Finnish.

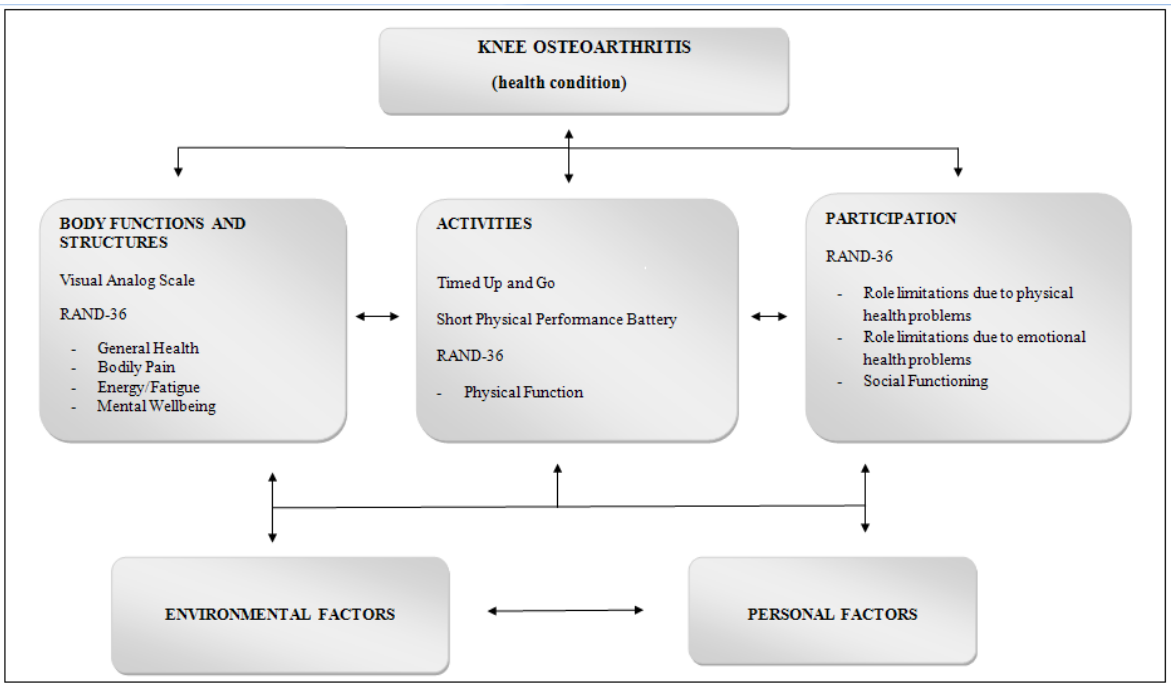

Figure 3 Measurements in ICF

7.3 Analyzing methods

We have calculated means, maximums, minimums and standard deviations from our data. Mean is the sum of all scores in a distribution divided by the total number of cases. (Argyrous 2011, 178.) Minimum is the lowest score and maximum is the highest score in a distribution. Range is the difference between these two scores. (Argyrous 2011, 192.) Standard deviation shows each scores average distance from the mean (Argyrous 2011, 194).

In our study Pearson's and Spearman's correlations are used to study relationships between variables. Correlation coefficient varies between -1 and +1. Value -1 describes very strong negative correlation and value + 1 very strong positive correlation. Correlation shows that two variables are related, but does not mean that one variable is caused by the other. We used Pearson's correlation to calculate the correlation between perceived pain while moving and TUG-test results and between average perceived pain and RAND-36 items, because all above mentioned variables are in ratio scale. We used Spearman's correlation to calculate the correlation between perceived pain while moving and SPPB score, because SPPB test variables are in ordinal scale. (Munro 2001, 223, 227.)

To compare the results between study group and control group we used parametric and nonparametric methods. We used parametric t-test to compare TUG-test mean results between the two groups. In order to use the T-test, compared samples must be normally distributed. If compared samples are not normally distributed, non-parametric Mann-Whitney's U-test is used. We used the latter test to compare RAND-36 and SPPB results between study and control group. (Munro 2001, 123-127.) Data processing and statistical analyses were performed using Statistical Package for Social Sciences (SPSS) v.19 program.

8 RESULTS

8.1 Describing the groups

Study group included 27 women, mean age 75 years (sd ± 4,9). The youngest person was 67 and the oldest 85 years old. None of our study group participants used walking aids and only one participant was using painkillers. Seven participants of our study group were having targeted medication for knee osteoarthritis.

Analyzing the KOOS scores we can see that, study group reported biggest problems in sport and recreation with mean score of 45, 65 out of 100. Second lowest score was in Quality of Life with 55,7. Table (1) shows study groups KOOS-results.

Table 1. KOOS-results in study group

KOOS items	Mean	Standard deviation	Minimum (0)	Maximum (100)
Symptoms	67,7	14,9	35,7	89,2
Pain	69,3	17,7	28,9	100
ADL	68,7	16,9	33,8	98,5
Sport and recreation	45,7	24,8	0	95
QoL	55,7	17,5	25	100

Control group included 28 women, mean age 74 year (sd±4,5). The Youngest person was 65 and the oldest 80 years old. None of our control group participants used walking aids.

8.2 Functional Ability in Knee Osteoarthritis

The Study group's mean in Timed Up and Go test (TUG) was 10, 8 seconds (sd ± 2,56). The fastest result in the study group was 5,4 seconds and the slowest result was 15,5 seconds.

In SPPB the study group´s mean was 9,8 (sd ± 1,35). The lowest score was 6 points and highest the score was 11 points. SPPB is divided into three different sections, which are balance, gait speed and chair stands. The tested person is able to get 0-4 points from each section, so that the maximum total score is 12 points. From the study group 78% got 4 points in the balance section, 18,5% got 3 points and 3,7% got 2 points. From gait speed part 55,6% got 4 points, 22,2% got 3 points and 22,2% got 2 points. In the chair test there were no 4 points scores, however 18,5% got 3 points, 25,9% got 2 points and 55,6% got only 1 point.

8.3 Quality of Life in Knee Osteoarthritis

Quality of life was measured with Rand 36 –questionnaire. Maximum score in RAND-36 is 100 (Hays & Morales 2001, 351.) The lowest mean scores were reported in General Health (48,52), Role limitations due to physical health problems (50,00) and Physical Function (51,11). The best score was in Social Functioning (80,28). (Table 2)

Table 2. RAND-36 results in study group

RAND-36 items	Mean	Standard deviation	Minimum (0)	Maximum (100)
Physical Function	51,1	17,9	20	80
Role limitations/physical	50,0	40,3	0	100
Role limitations/emotional	66,7	42,4	0	100
Energy/fatigue	67,2	18,4	30	95
Social functioning	80,3	20,3	25	100
Emotional well-being	78,2	17,9	28	100
Bodily pain	61,9	19,7	25	100
General health	**48,5**	**19,3**	**15**	**90**

8.4 Effect of pain on Functional Ability and Quality of Life

The study group participants (n=26) filled up a pain diary for five days. The results are a calculation of these five days. Mean VAS score in perceived pain while resting was 1, 4 (sd±1,20). Minimum resting pain was 0 and maximum was 4,1. Mean in pain while moving was 2, 7 (sd±1,82). Minimum moving pain was 0 and maximum 6, 2. The mean of perceived pain in total, when including resting pain and moving pain was 2,1 (sd±1,48) (Figure 4).

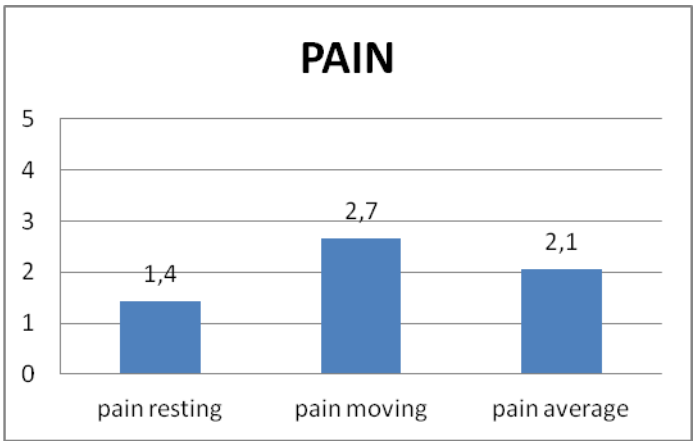

Figure 4. VAS-mean scores while resting, moving and average in study group

Correlation between intensity of pain brought by knee osteoarthritis and functional ability was counted using the pain while moving measured with VAS-scale and TUG-test results. The same counting was made between pain while moving and SPPB results. The Pearsons correlation between perceived pain while moving and TUG-test is strong positive (r=0,522>0,400) and the result is significant (p=0,006<0,05). The Spearman's correlation between perceived pain while moving and SPPB-test was strong negative (r=-0,649<-0,600) and the result is significant (p=0,000<0,001).

Pearsons correlation between intensity of pain brought by knee osteoarthritis and quality of life was counted using the perceived mean pain and RAND- 36 questionnaire 8 different items. The following table presents r- and p-values of those items. The correlation between pain and physical function is strong negative (r=-0,658<-0,400) and the result is statistically significant (p=0,000<0,001). A strong negative correlation is also found between bodily pain and average pain (VAS) (r=-0,663<-0,400) and the result is very significant (p= 0,000<0,001). The correlation between role limitation due to physical health problems and pain is moderate negative (r=-0,377>-0,4) but the result is not statistically significant (p=0,058>0,05). Between general health perceptions and pain the correlation is weak negative (r=-0,210<-0,200), but the result is not significant (p= 0,303<0,05). There are no relations between other items (Table 3).

Table 3. Pearson's correlation (r-value) and significance levels (p-value) for RAND-36 in study group

Rand 36-items	r-value	p-value
Physical function	-0,658	0,000
Role limitations/physical	-0,377	0,058
Role limitations/emotional	-0,157	0,444
Energy/fatigue	-0,10	0,359
Social functioning	0,099	0,631
Emotional well-being	-0,120	0,558
Bodily pain	-0,663	0,000
General health	-0,210	0,303

8.5 Quality of life and functional ability people with knee osteoarthritis compared to people without knee osteoarthritis

Functional ability was measured with SPPB and TUG. In the study group the mean in TUG test was 10,8 seconds (sd± 2,56) and in the control group the mean was 8,6 (sd±1,23) seconds. The fastest result in the study group was 5,4 seconds and in the control group 7,2 seconds. The slowest result in the study group was 15,5 seconds and in the control group 12,0 seconds. Comparing the means of TUG between the study group and control group, a difference of 2,2 seconds was found, for the benefit of control group. When comparing the study group and control group there was a statistically significant difference between the means ($p=0,000<0,001$). The control group was faster in the TUG-test compaired to the study group (Figure 5).

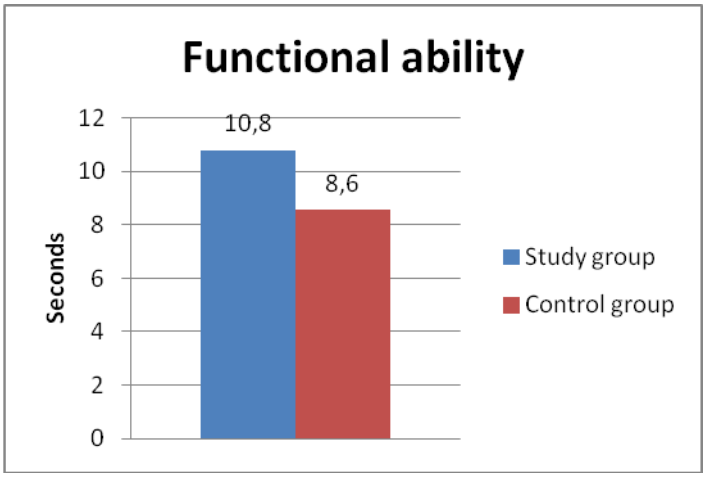

Figure 5. Mean walking times in TUG

In SPPB test the study group´s mean was 9,8 points (sd±1,35) and the control group's mean was 10,8 (sd± 1,02). The highest score in the study group was 11 and in the control group 12 points. The lowest score in the study group was 6 points and in the control group 9 points. The control group´s mean of the points is higher than the study groups. When comparing the study group and control group there is statistically significant difference between the means (p=0,000<0,001). (Figure 6)

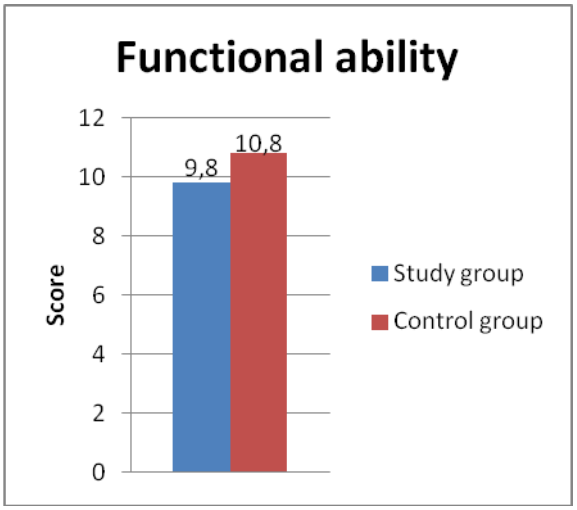

Figure 6. Mean scores in SPPB

From the control group 85,7% scored 10-12 points in total in SPPB, when the same percent of the study group was only 29,6%. 14,3% of the control group scored 7-9 in total, when the same percent in the study group was 63%. 0% of the

control group scored 4-6 in total when 7,5% of the study group scored that amount of points in total (Figure 7).

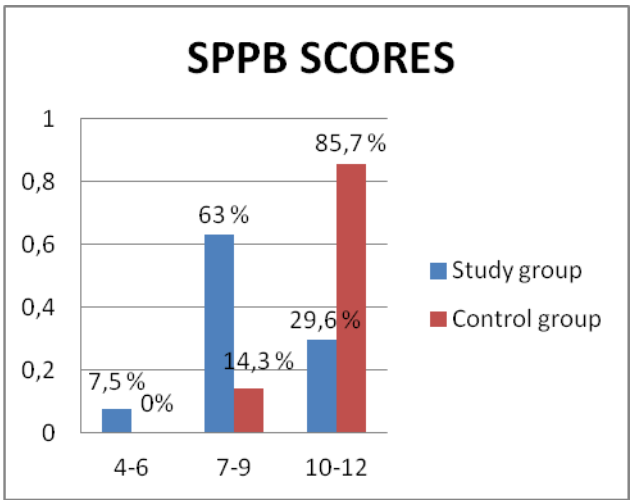

Figure 7. Section mean scores in SPPB

Quality of life was measured with RAND-36 questionnaire. When comparing the mean scores of RAND-36 items between the study group and control group there were statistical differences in physical function (p=0,000<0,001), role limitations due to physical health problems (p= 0,018<0,05) and general health perceptions (p=0,002<0,05) in favor of the control group. The differences were statistically significant (p=0,000<0,001). In bodily pain there was also a statistically significant difference (p=0,023<0,05). In sections role limitations due to personal or emotional problems, energy/fatigue, social functioning and mental well-being no statistically significant differences could not be shown. The following table shows mean scores from the study and control group (Table 4).

Table 4. RAND-36 mean scores and standard deviations (SD) in study and control group

RAND-36 items	Study group mean	Study group SD	Control group mean	Control group SD
Physical Function	51,1	17,9	82,3	16,2
Rolelimitations/physical	50,0	40,3	75,9	24,0
Rolelimitations/emotional	66,7	42,4	69,1	37,3
Energy/fatigue	67,2	18,4	73,4	15,3
Social functioning	80,3	20,3	86,3	19,3
Emotional well-being	78,2	17,9	80,0	12,3
Bodily pain	61,9	19,7	74,5	15,8
General health	48,5	19,3	64,3	13,6

9 DISCUSSION

We have been comparing our results to the reference values of previous studies. This allows us to make some conclusions of our results and see if the knee OA affects to peoples functional ability and quality of life.

The mean Timed up and Go- test value of our study group was 10.8 seconds. Bohannon (2006) published a meta-analysis on the Timed up and Go - test and found mean reference values for 3 age groups: 8.1 (7.1–9.0) seconds for 60 to 69 year old, 9.2 (8.2–10.2) seconds for 70 to 79 years, and 11.3 (10.0–12.7) seconds for 80 to 99 years. The author states that patients, whose performances exceed the upper limit of reported confidence intervals, can be considered to have a worse performance than average. As our study groups mean age was 75 years, we chose a 70–79 years reference group to interpret our results. Our study group's mean value in Timed up and Go is within the confidence interval of 70 to 79 years age group. Nevertheless, 56% (n=15) of the participants of our study group exceeded the upper limit of confidence interval, which indicates that their performance is worse than average.

The mean score of SPPB was 9.8 in our study group. We used validated SPPB cut points by Guralnik et al. (1994, M89) in which scores greater than 9 were considered as mild to no mobility limitation. Even though the mean score of our study group suggests that they had mild mobility limitation, 70% of them got a score of 9 or lower indicating that most of the study group had moderate mobility limitation.

According to Vasunilashorn et al. (2009, 227), participants with SPPB scores of 10 or lower at baseline had significantly higher odds for mobility disability at follow-up compared with those who scored 12. Low SPPB score was significantly associated with loss of ability to walk 400 meters after 3 years. Our study groups mean SPPB score was 9,8, thus considering the reference value the decrease in their functional ability can be predicted in 3 years.

A study done by Eggermont et al (2009,769) shows that increased pain sites and pain severity of chronic pain in lower extremities is associated with poorer SPPB performance. Most difficulties considering SPPB were found in five repetitive chair

stands, which measured leg strength. None of our study group perceived total 4 points and over half of the group, 56 % gained only one point. This may be explained by the fact that standing up from the chair requires a lot of strength in the quadriceps femoris muscles, and the strength of the quadriceps, according to O'Reilly et al (1998, 592), is strongly associated with pain in the knee.

VanderZee et al. (1996) published an article about RAND-36 and its reliability and validity in a population sample of 1063 inhabitants of Dutch township. In this survey they published the mean scores of RAND-36 items for different age groups. As our study group's mean age was 75 years, we have chosen the RAND-36 values of the age group 63–77 in VanderZee et al. study to serve as reference values. There were differences in most of the values, but the biggest decrease in QOL of our study group can be seen in the following RAND-36 parts: Physical functioning (study group 51,1; reference score 64,8), role limitations due to physical health problems (study group 50,0; reference score 69,3), role limitations due to emotional health problems (study group 66,7; reference score 83.3), bodily pain (study group 61,9; reference score 73,8) and general health perceptions (study group 48,5; reference score 59,6). According to this study it can be concluded that knee osteoarthritis affects the quality of life negatively. We will present here another survey made in Finland concerning RAND-36.

Aalto et al (1999) have published a survey about RAND-36 and its reliability and validity in Finnish population. The research data was collected by sending the survey randomly to 3000 Finnish people aged 18–79 years and finally 2175 people took apart by answering the survey. In this survey they published the mean scores of RAND-36 items for different age groups. As our study group's mean age was 75 years, we have compared the RAND-36 values of the age group 74–79 in Aalto et al survey to serve as reference values. The mean scores of all the reference values were lower than in our study. According to this study knee osteoarthritis does not affect quality of life negatively. There is a discrepancy between the results compared to these two surveys. However, VanderZee at al survey seems to have a lot support in the findings of previous studies of other authors and so in conclusion we can say that knee osteoarthritis affects quality of life negatively

(Yildiz et al., 2010; Boutron et al., 2008; van Dijk et al., 2008; Elliott et al., 2007; Salaffi et al., 2005; Jordan et al., 1997; Guccione et al., 1994).

In this study we found strong positive correlation between intensity of pain while moving and TUG- test result and the result was significant. The correlation between perceived pain while moving and SPPB-test was strong negative and the result is significant as well. Assessing the correlation between average perceived pain and RAND-36 items we found that there is a significant strong negative correlation between perceived pain and following RAND-36 items: physical function and bodily pain.

The data gathered in this study suggests, that pain has a strong influence on one's functional ability and the part of quality of life, which is related to physical functioning. Considering these results through ICF, pain brought by knee osteoarthritis has an effect on person's activities, but not on person's participation. Nevertheless, we cannot forget, that people in our study group had knee OA, in addition to other symptoms which also may have influenced the functional ability and QOL. However for most of the OA patients pain is said to be the most troublesome symptom (Peter et al 2010, 3).

According to functional ability measured with TUG and SPPB, the difference between the study group and control group was statistically significant. Considering these results through ICF, knee osteoarthritis influences a person's activity.

Quality of life results measured with RAND-36 shows that there are significant differences in physical function, role limitations due to physical health problems, general health and in bodily pain between the study group and control group. Viewing these results through ICF, knee osteoarthritis affects a person's activities (physical function), some parts of body structures and functions (general health and bodily pain) and also some parts of participation (role limitations due to physical health problems).

Pain was measured for five days in the mornings. To receive wider information of pain and differences during the day, pain should have been measured at least twice a day, in the morning and in the evening. Members of the study group could have filled the pain diary for a longer period than five days. It is good to consider

whether we chose the most optimal tests for this study. There are a great deal of reliable tests for functional ability, quality of life and pain available. However, previous studies have shown that our chosen tests are reliable when measuring lower extremity function and mobility skills of elderly people. In addition to reliability, these tests were simple to implement, did not require any special equipment and were international. It is not possible to be sure if all tests were accomplished exactly the same way, even though the testing order was fixed, tests had been practiced the same way in advance, and all test instructions had been studied together. The tester can always make mistakes when measuring something with stopwatch and the reaction time of the tester is important.

When gathering the study groups, we organized several info meetings and contacted to osteoarthritis associations to gather up the study group. We managed to gather up only part of the study group from these contacts. Rest of the study group was gathered up mostly from exercise groups for seniors, so they were physically active people. This might be the reason, why the study group had such good results from functional ability tests.

To ensure good ethics in our study, participants signed an informed consent that they are taking part in this study by their own responsibility and that confidentiality is guaranteed by us. Each participant filled the ALPHA-FIT health questionnaire before testing. With the health questionnaire we made sure that the participants' health status is in a safe level for testing. All the data was processed and introduced anonymously. We have been scrupulous about the results and that made it trustworthy.

ICF helps physiotherapists to understand all the areas in one's life where the knee OA can affect. According to our results knee OA affects negatively to functional ability and when functional ability becomes impaired it seems to also have an effect to the parts of quality of life demanding physical functioning. Physiotherapy should focus on pain relieving and maintaining functional ability. It is important for the health care professional to understand, that by treating the patient well we have an opportunity to help the patient to maintain the quality of life. The goals of physiotherapy should be set to the level of participation. When the QoL is improving, it is also motivating the patient to exercise.

This was the first bachelor thesis made in Nordplus -project cooperation, which produced one final thesis written by four students from two different countries. When working with a study or a project, it is usual to face some difficulties on the way. Our bachelor thesis was no exception. One of our group members withdrew out in the end of August 2012 and a new member joined the group in September 2012. After that the project work really started. It is a challenge to work in an international group with a foreign language and reconciliate the guidelines of BT from three different schools.

Our recommendations for further studies are to include more countries to the study to get a wider picture of knee OA and possibly also compare the results between different countries. In addition we recommend, that in further studies less physically active participants should be included in the study. Then the effects of knee OA to functional ability and quality of life might be bigger. It might also be interesting to compare the pain experiences and possible cultural differences with treating knee OA.

10 CONCLUSION

1. Knee Osteoarthritis affects the functional ability negatively. 56 percent of our study group gained a lower than average score in the TUG test. According to SPPB scores, 70 percent of our study group had moderate disability and 30 percent had mild to no disability.

2. Knee Osteoarthritis affects the quality of life negatively. Our study group's QoL was lower than average in the same age group.

3. Pain brought by the knee OA has a strong effect on person's functional ability and the part of QoL, which is related to physical functioning, but not to other parts of QoL.

4. The study group had significantly lower functional ability than the control group. The following parts of QoL were also significantly lower in the study group: physical functioning, role limitations due to physical health problems, general health and bodily pain.

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APPENDICES

APPENDIX 1 Preliminary form for study group

We are four physiotherapy students writing our Bachelor Thesis about the effects of knee osteoarthritis to person's functional ability and quality of life. The Bachelor Thesis is written in international cooperation. The aim of our study is to improve understanding of the effects of knee osteoarthritis to person's everyday life.

We are searching participants to our study group with following criterias. Please put a cross on the box next to the sentence, if it is correct:

- ☐ You are over 65-years
- ☐ You have had knee pain in the last three months
- ☐ You have knee osteoarthritis diagnosed by doctor
- ☐ You don't have lower extremity replacements
- ☐ You live at home
- ☐ You are able to function with or without aids
- ☐ You can manage the activities of daily living independently or with a small help
- ☐ You don't have any other rheumatic disease
- ☐ You have not been prohibited to exercise by doctor
- ☐ You want to take apart in this study
- ☐ You have been informed that the data collected in the study will be handled anonymously
- ☐ You have been informed that the participants will take apart in this study by their own responsibility

Testing day includes questionnaires and physical tests. Physical test can for example be standing up from a chair. Participation to our study gives you information about your own functional ability. After the study the results will be presented to the all study participants. All data collected in this study will be handled anonymously and confidentially.

Please fill Your name and address information below:

Name: _____

Address:_____

APPENDIX 2 Preliminary form for control group

We are four physiotherapy students writing our Bachelor Thesis about the effects of knee osteoarthritis to person's functional ability and quality of life. The Bachelor Thesis is written in international cooperation. The aim of our study is to improve understanding of the effects of knee osteoarthritis to person's everyday life.

We are searching participants to our control group with following criterias. Please put a cross on the box next to the sentence, if it is correct:

- ☐ You are over 65-years
- ☐ You haven't had knee pain in the last three months
- ☐ You don't have knee osteoarthritis diagnosed by doctor
- ☐ You don't have lower extremity replacements
- ☐ You live at home
- ☐ You are able to function with or without aids
- ☐ You can manage the activities of daily living independently or with a small help
- ☐ You don't have any other rheumatic disease
- ☐ You have not been prohibited to exercise by doctor
- ☐ You want to take apart in this study
- ☐ You have been informed that the data collected in the study will be handled anonymously
- ☐ You have been informed that the participants will take apart in this study by their own responsibility

Testing day includes questionnaires and physical tests. Physical test can for example be standing up from a chair. Participation to our study gives you information about your own functional ability. After the study the results will be presented to the all study participants. All data collected in this study will be handled anonymously and confidentially.

Please fill Your name and address information below:

Name: _____

Address:_____

APPENDIX 3 Health questionnaire

ALPHA-FIT HEALTH QUESTIONNAIRE

Circle the most suitable alternative in response to the following questions.

1. How do you estimate your own health status?

1 very poor

2 poor

3 average

4 good

5 very good

2. How do you estimate your physical fitness in comparison with that of other persons of the same age?

1 clearly poorer

2 somewhat poorer

3 just as good

4 somewhat better

5 considerably better

Read the following questions carefully and respond by circling either yes or no

3. Do you have a heart disease, circulation disorder or lung disease that has been diagnosed by a doctor? yes no

What? _____

4. Do you ever experience chest pain or breathlessness

a) while resting? yes no

b) while physically active? yes no

5. Has a doctor ever stated that your blood pressure is permanently increased

(do you suffer from "hypertension")?

yes no

6. Have you smoked regularly during the last six months?

yes no

7. Do you often feel faint or have dizzy spells?

yes no

8. Have you ever been diagnosed by a doctor as having an inflammatory disease of the joints?

yes no

9. Do you have low back problems or any other chronic or recurring musculoskeletal disorder?

yes no

What? _____

10. Do you have any other health-related reason (that is not mentioned above) that would limit your participation in physical activity, even though you want to participate?

yes no

What?_____

11. Are you currently taking any medication?

yes no

What? _____

12. Have you had the flu or a fever during the last two weeks?

yes no

13. Have you imbibed a substantial amount of alcohol within the last 24 hours (more than 2 restaurant-size drinks)?

yes no

Suni, J., Husu, P. & Rinne, M. 2009. Fitness for health: the ALPHA-FIT test battery for adults aged 18-69: tester's manual. [Online publication]. Tampere: The UKK Institute for Health Promotion Research and European Union, ALPHA-project. [Ref. 26.4.2013]. Available at: http://www.ukkinstituutti.fi/filebank/500-ALPHA_FIT_Testers_Manual.pdf

APPENDIX 4 SHORT PHYSICAL PERFORMANCE BATTERY

Study ID
Date
Tester Initials

SHORT PHYSICAL PERFORMANCE BATTERY PROTOCOL AND SCORE SHEET

All of the tests should be performed in the same order as they are presented in this protocol. Instructions to the participants are shown in bold italic and should be given exactly as they are written in this script.

1. BALANCE TESTS

The participant must be able to stand unassisted without the use of a cane or walker. You may help the participant to get up.

Now let's begin the evaluation. I would now like you to try to move your body in different movements. I will first describe and show each movement to you. Then I'd like you to try to do it. If you cannot do a particular movement, or if you feel it would be unsafe to try to do it, tell me and we'll move on to the next one. Let me emphasize that I do not want you to try to do any exercise that you feel might be unsafe.

Do you have any questions before we begin?

A. Side-by-Side Stand

1. *Now I will show you the first movement*.
2. (Demonstrate) *I want you to try to stand with your feet together, side-by-side, for about 10 seconds.*
3. *You may use your arms, bend your knees, or move your body to maintain your balance, but try not to move your feet. Try to hold this position until I tell you to stop.*
4. Stand next to the participant to help him/her into the side-by-side position.
5. Supply just enough support to the participant's arm to prevent loss of balance.
6. When the participant has his/her feet together, ask *"Are you ready?"*
7. Then let go and begin timing as you say, *"Ready, begin."*
8. Stop the stopwatch and say *"Stop"* after 10 seconds or when the participant steps out of position or grabs your arm.
9. If participant is unable to hold the position for 10 seconds, record result and go to the gait speed test.

Study ID
Date
Tester Initials

B. Semi-Tandem Stand

1. *Now I will show you the second movement*.
2. (Demonstrate) *Now I want you to try to stand with the side of the heel of one foot touching the big toe of the other foot for about 10 seconds. You may put either foot in front, whichever is more comfortable for you.*
3. *You may use your arms, bend your knees, or move your body to maintain your balance, but try not to move your feet. Try to hold this position until I tell you to stop*.
4. Stand next to the participant to help him/her into the semi-tandem position
5. Supply just enough support to the participant's arm to prevent loss of balance.
6. When the participant has his/her feet together, ask *"Are you ready?"*
7. Then let go and begin timing as you say *"Ready, begin."*
8. Stop the stopwatch and say "*Stop*" after 10 seconds or when the participant steps out of position or grabs your arm.
9. If participant is unable to hold the position for 10 seconds, record result and go to the gait speed test.

C. Tandem Stand

1. *Now I will show you the third movement.*
2. (Demonstrate) *Now I want you to try to stand with the heel of one foot in front of and touching the toes of the other foot for about 10 seconds. You may put either foot in front, whichever is more comfortable for you.*
3. *You may use your arms, bend your knees, or move your body to maintain your balance, but try not to move your feet. Try to hold this position until I tell you to stop*.
4. Stand next to the participant to help him/her into the tandem position.
5. Supply just enough support to the participant's arm to prevent loss of balance.
6. When the participant has his/her feet together, ask "*Are you ready?"*
7. Then let go and begin timing as you say, "*Ready, begin*."
8. Stop the stopwatch and say "*Stop*" after 10 seconds or when the participant steps out of position or grabs your arm.

Study ID
Date
Tester Initials

SCORING:

A. Side-by-side-stand

Held for 10 sec ❒ 1 point
Not held for 10 sec ❒0 points
1
Not attempted ❒ 0 points
2
If 0 points, end Balance Tests
3

Number of seconds held if
5
less than 10 sec: . sec
6

If participant did not attempt test or failed, circle why:

Tried but unable

Participant could not hold position unassisted

Not attempted, you felt unsafe

Not attempted, participant felt unsafe
4
Participant unable to understand instructions

Other (specify)

Participant refused
7

B. Semi-Tandem Stand

Held for 10 sec ❒ 1 point
Not held for 10 sec ❒ 0 points
Not attempted ❒ 0 points (circle reason above)
If 0 points, end Balance Tests

Number of seconds held if less than 10 sec: . sec

C. Tandem Stand

Held for 10 sec ❒ 2 points
Held for 3 to 9.99 sec ❒ 1 point
Held for < than 3 sec ❒ 0 points
Not attempted ❒ 0 points (circle reason above)
Number of seconds held if less than 10 sec: . sec

D. Total Balance Tests score (sum points)

Comments:

Study ID
Date
Tester Initials

2. GAIT SPEED TEST
Now I am going to observe how you normally walk. If you use a cane or other walking aid and you feel you need it to walk a short distance, then you may use it.

A. First Gait Speed Test
1. *This is our walking course. I want you to walk to the other end of the course at your usual speed, just as if you were walking down the street to go to the store.*
2. Demonstrate the walk for the participant.
3. *Walk all the way past the other end of the tape before you stop. I will walk with you. Do you feel this would be safe?*
4. Have the participant stand with both feet touching the starting line.
5. When I want you to start, I will say: "*Ready, begin."*
When the participant acknowledges this instruction say: *"Ready, begin."*
6. Press the start/stop button to start the stopwatch as the participant begins walking.
7. Walk behind and to the side of the participant.
8. Stop timing when one of the participant's feet is completely across the end line.

B. Second Gait Speed Test
1. *Now I want you to repeat the walk. Remember to walk at your usual pace, and go all the way past the other end of the course.*
2. Have the participant stand with both feet touching the starting line.
3. When I want you to start, I will say: "*Ready, begin*."
When the participant acknowledges this instruction say: "*Ready, begin*."
4. Press the start/stop button to start the stopwatch as the participant begins walking.
5. Walk behind and to the side of the participant.
6. Stop timing when one of the participant's feet is completely across the end line.

Study ID
Date
Tester Initials

GAIT SPEED TEST SCORING:

Length of walk test course:
Four meters ❒
Three meters ❒

A. Time for First Gait Speed Test (sec)
1. Time for 3 or 4 meters sec

2. If participant did not attempt test or failed, circle why:

Tried but unable	1
Participant could not walk unassisted	2
Not attempted, you felt unsafe	3
Not attempted, participant felt unsafe	4
Participant unable to understand instructions	5
Other (Specify)	6
Participant refused	7

Complete score sheet and go to chair stand test
3. Aids for first walk.....None ❒ Cane ❒ Other ❒

Comments:

B. Time for Second Gait Speed Test (sec)
1. Time for 3 or 4 meters . sec

2. If participant did not attempt test or failed, circle why:

Tried but unable	1
Participant could not walk unassisted	2
Not attempted, you felt unsafe	3
Not attempted, participant felt unsafe	4
Participant unable to understand instructions	5
Other (Specify)	6
Participant refused	7

3. Aids for second walk..... None ❒ Cane ❒ Other ❒

What is the time for the faster of the two walks?
Record the shorter of the two times . sec
[If only 1 walk done, record that time] . sec
If the participant was unable to do the walk: ❒0 points

For 4-Meter Walk:	For 3-Meter Walk:
If time is more than 8.70 sec:❒1 point	If time is more than 6.52 sec:❒ 1point

If time is 6.21 to 8.70 sec: ❒2 points
If time is 4.82 to 6.20 sec:❒3 points
If time is less than 4.82 sec: ❒ 4 points

If time is 4.66 to 6.52 sec:❒2 points
If time is 3.62 to 4.65 sec:❒3 points
If time is less than 3.62 sec:❒4 points

3. CHAIR STAND TEST

Single Chair Stand

1. *Let's do the last movement test. Do you think it would be safe for you to try to stand up from a chair without using your arms?*
2. *The next test measures the strength in your legs*.
3. (Demonstrate and explain the procedure.) *First, fold your arms across your chest and sit so that your feet are on the floor; then stand up keeping your arms folded across your chest.*
4. *Please stand up keeping your arms folded across your chest*. (Record result).
5. If participant cannot rise without using arms, say "*Okay, try to stand up using your arms."*

This is the end of their test. Record result and go to the scoring page.

Repeated Chair Stands

1. *Do you think it would be safe for you to try to stand up from a chair five times without using your arms?*
2. (Demonstrate and explain the procedure): *Please stand up straight as QUICK-LY as you can five times, without stopping in between. After standing up each time, sit down and then stand up again. Keep your arms folded across your chest. I'll be timing you with a stopwatch.*
3. When the participant is properly seated, say: *"Ready? Stand"* and begin timing.
4. Count out loud as the participant arises each time, up to five times.
5. Stop if participant becomes tired or short of breath during repeated chair stands.
6. Stop the stopwatch when he/she has straightened up completely for the fifth time.
7. Also stop:
    - If participant uses his/her arms
    - After 1 minute, if participant has not completed rises
    - At your discretion, if concerned for participant's safety
8. If the participant stops and appears to be fatigued before completing the five stands, confirm this by asking "*Can you continue?"*
9. If participant says "*Yes,*" continue timing. If participant says *"No*," stop and reset the stopwatch.

Study ID
Date
Tester Initials

SCORING

Single Chair Stand Test

A. Safe to stand without help YES❒ NO❒

B. Results:

Participant stood without using arms ❒ → Go to Repeated Chair Stand Test
Participant used arms to stand ❒ → End test; score as 0 points
Test not completed ❒ → End test; score as 0 points

C. If participant did not attempt test or failed, circle why:

Tried but unable	1
Participant could not stand unassisted	2
Not attempted, you felt unsafe	3
Not attempted, participant felt unsafe	4
Participant unable to understand instructions	5
Other (Specify)	6
Participant refused	7

Repeated Chair Stand Test

A. Safe to stand five times YES❒ NO ❒

B. If five stands done successfully, record time in seconds.
Time to complete five stands . sec

C. If participant did not attempt test or failed, circle why:

Tried but unable	1
Participant could not stand unassisted	2
Not attempted, you felt unsafe	3
Not attempted, participant felt unsafe	4
Participant unable to understand instructions	5
Other (Specify)	6
Participant refused	7

Scoring the Repeated Chair Test
Participant unable to complete 5 chair stands or completes stands in >60 sec: ❒0 points
If chair stand time is 16.70 sec or more: ❒1 points

If chair stand time is 13.70 to 16.69 sec: ❒2 points
If chair stand time is 11.20 to 13.69 sec: ❒3 points
If chair stand time is 11.19 sec or less: ❒4 points

Scoring for Complete Short Physical Performance Battery

Test Scores

Total Balance Test score _____ points
Gait Speed Test score _____ points
Chair Stand Test score _____ points

Total Score _____ **points** (sum of points above)

APPENDIX 5 TIMED UP AND GO TEST

Timed Up and Go (TUG) Test

1. Equipment: arm chair, tape measure, tape, stop watch.

2. Begin the test with the subject sitting correctly in a chair with arms, the subject's back should resting on the back of the chair. The chair should be stable and positioned such that it will not move when the subject moves from sitting to standing.

3. Place a piece of tape or other marker on the floor 3 meters away from the chair so that it is easily seen by the subject.

4. Instructions: "On the word *GO* you will stand up, walk to the line on the floor, turn around and walk back to the chair and sit down. Walk at your regular pace.

5. Start timing on the word "*GO*" and stop timing when the subject is seated again correctly in the chair with their back resting on the back of the chair.

6. The subject wears their regular footwear, may use any gait aid that they normally use during ambulation, but may not be assisted by another person. There is no time limit. They may stop and rest (but not sit down) if they need to.

7. Normal healthy elderly usually complete the task in ten seconds or less. Very frail or weak elderly with poor mobility may take 2 minutes or more.

8. The subject should be given a practice trial that is not timed before testing.

9. Results correlate with gait speed, balance, functional level,the ability to go out, and can follow change over time.

10. Interpretation
< 10 seconds = normal
< 20 seconds = good mobility, can go out alone, mobile without a gait aid.
< 30 seconds = problems, cannot go outside alone, requires a gait aid.

Podsiadlo D, Richardson S. 1991.The Time "Up & Go": A Test of Basic Functional Mobility for Frail Elderly Persons. Journal of the American Geriatrics
Society 1991; 39(2): 142148

Shumway CookA, Brauer S, Woollacott M. 2000. Predicting the Probability for Falls in CommunityDwelling Older Adults Using the Timed Up & Go Test.
Physical Therapy 2000 Vol 80(9): 896903. Saskatoon Falls Prevention Consortium, Falls Screening and Referral Algorithm.

APPENDIX 6 RAND-36 HEALTH QUESTIONNAIRE

RAND-36 HEALTH QUESTIONNAIRE

1. In general, would you say your health is:	
Excellent	1
Very good	2
Good	3
Fair	4
Poor	5

2. **Compared to one year ago**, how would your rate your health in general **now**?	
Much better now than one year ago	1
Somewhat better now than one year ago	2
About the same	3
Somewhat worse now than one year ago	4
Much worse now than one year ago	5

The following items are about activities you might do during a typical day. Does **your health now limit you** in these activities? If so, how much?

(Circle One Number on Each Line)

	Yes, Limi-ted a Lot	Yes, Limited a Little	No, Not limited at All
3. **Vigorous activities**, such as running, lifting heavy objects, participating in strenuous sports	[1]	[2]	[3]
4. **Moderate activities**, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf	[1]	[2]	[3]
5. Lifting or carrying groceries	[1]	[2]	[3]
6. Climbing **several** flights of stairs	[1]	[2]	[3]
7. Climbing **one** flight of stairs	[1]	[2]	[3]

8. Bending, kneeling, or stooping	[1]	[2]	[3]
9. Walking **more than a mile**	[1]	[2]	[3]
10. Walking **several blocks**	[1]	[2]	[3]
11. Walking **one block**	[1]	[2]	[3]
12. Bathing or dressing yourself	[1]	[2]	[3]

During the **past 4 weeks**, have you had any of the following problems with your work or other regular daily activities **as a result of your physical health**?

(Circle One Number on Each Line)

	Yes	No
13. Cut down the amount of time you spent on work or other activities	1	2
14. **Accomplished less** than you would like	1	2
15. Were limited in the **kind** of work or other activities	1	2
16. Had **difficulty** performing the work or other activities (for example, it took extra effort)	1	2

During the **past 4 weeks,** have you had any of the following problems with your work or other regular daily activities **as a result of any emotional problems** (such as feeling depressed or anxious)?

(Circle One Number on Each Line)

	Yes	No
17. Cut down the **amount of time** you spent on work or other activities	1	2
18. **Accomplished less** than you would like	1	2
19. Didn't do work or other activities as **carefully** as usual	1	2

20. During the **past 4 weeks,** to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbors, or groups?

(Circle One Number)

Not at all 1

Slightly 2

Moderately 3

Quite a bit 4

Extremely 5

21. How much **bodily** pain have you had during the **past 4 weeks**?

(Circle One Number)

None 1

Very mild 2

Mild 3

Moderate 4

Severe 5

Very severe 6

22. During the **past 4 weeks,** how much did **pain** interfere with your normal work (including both work outside the home and housework)?

(Circle One Number)

Not at all 1

A little bit 2

Moderately 3

Quite a bit 4

Extremely 5

These questions are about how you feel and how things have been with you **during the past 4 weeks**. For each question, please give the one answer that comes closest to the way you have been feeling.

How much of the time during the **past 4 weeks** . . .

(Circle One Number on Each Line)

	All of the Time	Most of the Time	A Good Bit of the Time	Some of the Ti-me	A Little of the Time	None of the Time
23. Did you feel full of pep?	1	2	3	4	5	6
24. Have you been a very nervous person?	1	2	3	4	5	6
25. Have you felt so down in the dumps that nothing could cheer you up?	1	2	3	4	5	6
26. Have you felt calm and peaceful?	1	2	3	4	5	6
27. Did you have a lot of energy?	1	2	3	4	5	6
28. Have you felt down-hearted and blue?	1	2	3	4	5	6
29. Did you feel worn out?	1	2	3	4	5	6
30. Have you been a hap-py person?	1	2	3	4	5	6
31. Did you feel tired?	1	2	3	4	5	6

32. During the **past 4 weeks,** how much of the time has your **physical health or emotional prob-lems** interfered with your social activities (like visiting with friends, relatives, etc.)?

(Circle One Number)

All of the time 1

Most of the time 2

Some of the time 3

A little of the time 4

None of the time 5

How TRUE or FALSE is each of the following statements for you. **(Circle One Number on Each Line)**

	Definitely True	Mostly True	Don't Know	Mostly False	Definitely False
33. I seem to get sick a little easier than other people	1	2	3	4	5
34. I am as healthy as any-body I know	1	2	3	4	5
35. I expect my health to get worse	1	2	3	4	5
36. My health is excellent	1	2	3	4	5

Rand Health 2010. Last modified 1.3.2010. [webpage]. Available at: http://www.rand.org/health/surveys_tools/mos/mos_core_36item_survey.html

APPENDIX 7 Knee injury and Osteoarthritis Outcome Score (KOOS), English version LK1.0

KOOS KNEE SURVEY

Today's date: _____/_____/_____ Date of birth: _____/_____/_____

Name: _____

INSTRUCTIONS:

This survey asks for your view about your knee. This information will help us keep track of
how you feel about your knee and how well you are able to perform your usual activities.
Answer every question by ticking the best option, only one option for each question. If you are unsure about how to answer a question, please give the best answer you can.

Symptoms

These questions should be answered thinking of your knee symptoms during the last week.

S1. Do you have swelling in your knee?

Never Rarely Sometimes Often Always

S2. Do you feel grinding, hear clicking or any other type of noise when your knee moves?

Never Rarely Sometimes Often Always

S3. Does your knee catch or hang up when moving?

Never Rarely Sometimes Often Always

S4. Can you straighten your knee fully?

Always Often Sometimes Rarely Never

S5. Can you bend your knee fully?

Always Often Sometimes Rarely Never

Stiffness

The following questions concern the amount of joint stiffness you have experienced during the last week in your knee. Stiffness is a sensation of restriction or slowness in the ease with which you move your knee joint.

S6. How severe is your knee joint stiffness after first wakening in the morning?

None Mild Moderate Severe Extreme

S7. How severe is your knee stiffness after sitting, lying or resting later in the day?

None Mild Moderate Severe Extreme

Pain

P1. How often do you experience knee pain?

Never Monthly Weekly Daily Always

What amount of knee pain have you experienced the last week during the following activities?

P2. Twisting/pivoting on your knee

None Mild Moderate Severe Extreme

P3. Straightening knee fully

None Mild Moderate Severe Extreme

P4. Bending knee fully

None Mild Moderate Severe Extreme

P5. Walking on flat surface

None Mild Moderate Severe Extreme

P6. Going up or down stairs

None Mild Moderate Severe Extreme

P7. At night while in bed

None Mild Moderate Severe Extreme

P8. Sitting or lying

None Mild Moderate Severe Extreme

P9. Standing upright

None Mild Moderate Severe Extreme

Function, daily living

The following questions concern your physical function. By this we mean your ability to move around and to look after yourself. For each of the following activities please indicate the degree of difficulty you have experienced in the last week due to your knee.

A1. Descending stairs

None Mild Moderate Severe Extreme

A2. Ascending stairs

None Mild Moderate Severe Extreme

For each of the following activities please indicate the degree of difficulty you have experienced in the last week due to your knee.

A3. Rising from sitting

None Mild Moderate Severe Extreme

A4. Standing

None Mild Moderate Severe Extreme

A5. Bending to floor/pick up an object

None Mild Moderate Severe Extreme

A6. Walking on flat surface

None Mild Moderate Severe Extreme

A7. Getting in/out of car

None Mild Moderate Severe Extreme

A8. Going shopping

None Mild Moderate Severe Extreme

A9. Putting on socks/stockings

None Mild Moderate Severe Extreme

A10. Rising from bed

None Mild Moderate Severe Extreme

A11. Taking off socks/stockings

None Mild Moderate Severe Extreme

A12. Lying in bed (turning over, maintaining knee position)

None Mild Moderate Severe Extreme

A13. Getting in/out of bath

None Mild Moderate Severe Extreme

A14. Sitting

None Mild Moderate Severe Extreme

A15. Getting on/off toilet

None Mild Moderate Severe Extreme

For each of the following activities please indicate the degree of difficulty you have experienced in the last week due to your knee.

A16. Heavy domestic duties (moving heavy boxes, scrubbing floors, etc.)

None Mild Moderate Severe Extreme

A17. Light domestic duties (cooking, dusting, etc)

None Mild Moderate Severe Extreme

Function, sports and recreational activities

The following questions concern your physical function when being active on a higher level. The questions should be answered thinking of what degree of difficulty you have experienced during the last week due to your knee.

SP1. Squatting

None Mild Moderate Severe Extreme

SP2. Running

None Mild Moderate Severe Extreme

SP3. Jumping

None Mild Moderate Severe Extreme

SP4. Twisting/pivoting on your injured knee

None Mild Moderate Severe Extreme

SP5. Kneeling

None Mild Moderate Severe Extreme

Quality of Life

Q1. How often are you aware of your knee problem?

Never	Monthly	Weekly	Daily	Constantly

Q2. Have you modified your life style to avoid potentially damaging activities to your knee?

Not at all	Mildly	Moderately	Severely	Totally

Q3. How much are you troubled with lack of confidence in your knee?

Not at all	Mildly	Moderately	Severely	Extremely

Q4. In general, how much difficulty do you have with your knee?

None	Mild	Moderate	Severe	Extreme

Thank you very much for completing all the questions in this questionnaire.

APPENDIX 8 PAIN DIARY

Please fill in Your name and address information:

Name:_____

Address:_____

Pain Diary Instructions:

- Please fill the pain diary every morning before taking any pain medication
- Mark your perceived pain to the VAS-scale(in the beginning of the line no pain and in the end of line worst pain)
- Fill in the perceived pain while resting (straight after waking up) and pain while moving (after being up for a while)
- Fill the diary daily from Tuesday to Saturday
- After filling it, please sent it by post with the given envelope
- We thank You for Your participation!

For further information and in case of problems or concerns You can contact us:

Tuesday:

Pain while resting in the morning

|———————————————————————————————|

No pain Worst pain possible

Pain while moving in the morning

|———————————————————————————————|

No pain Worst pain possible

Wednesday:

Pain while resting in the morning

|———————————————————————————————|

No pain Worst pain possible

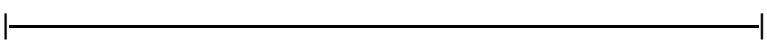
Pain while moving in the morning

|———————————————————————————————|

No pain Worst pain possible

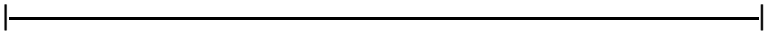
Thursday

Pain while resting in the morning



No pain Worst pain possible

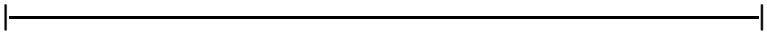
Pain while moving in the morning



No pain Worst pain possible

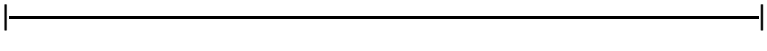
Friday

Pain while resting in the morning



No pain Worst pain possible

Pain while moving in the morning



No pain Worst pain possible

Saturday

Pain while resting in the morning

|——————————————————————————|

No pain Worst pain possible

Pain while moving in the morning

|——————————————————————————|

No pain Worst pain possible