Aggregated Locomotor Function Score in Knee Osteoarthritis Patients: Correlation with Clinical and Radiological Variables

Thesis submitted in partial fulfillment of Master Degree of Rheumatology &Rehabilitation

By

Marwa Tantawy Sayed

M.B; B.Ch, Cairo University

Supervisors

Prof. Dr. Bassel Kamal El Zorkany

Professor of Rheumatology & Rehabilitation

Faculty of Medicine, Cairo University

Prof .Dr. Soha Mostafa El Desouky

Assistant Professor of Rheumatology &Rehabilitation

Faculty of Medicine, Cairo University

Faculty of Medicine

Cairo University

2010

ACKNOWLEDGMENT

All the praise is due to ALLAH.

I would like to express my sincere gratitude to Prof. Dr. Bassel Kamal El Zorkany, professor of Rheumatology and Rehabilitation, Faculty of Medicine, Cairo University, for his continuous advice and encouragement.

My special thanks to Dr. Soha Mostafa El Desouky, Assistant Professor of Rheumatology and Rehabilitation, Faculty of Medicine, Cairo University, for her support and help that I do greatly appreciate.

I would like to express much thanks to all staff members of the Rheumatology and Rehabilitation Department in Faculty of Medicine, Cairo University and *to my dear colleagues for their support and cooperation.*

ABSTRACT

Objective: To assess the functional disability in knee osteoarthritis patients using aggregated locomotor function (ALF) score in correlation to clinical and radiological variables.

Patients and methods: 43 patients, 22 females (51.2 %) – 21 males (48.8%), with a clinical diagnosis of knee osteoarthritis were included in the study. The mean age of the patients in the study was 58.0 ± 9.0 (yrs) with a range of 40.0 – 75.0 (yrs). All subjects fulfilled American College of Rheumatology (ACR) clinical criteria for knee OA (2004). Patients were excluded if they had traumatic or inflammatory arthritis or major concurrent illness. All patients were subjected to full history taking, clinical examination, radiological evaluation and functional assessment using the ALF score.

Results: The mean time of the (ALF) score in the study patients was 43.58 ± 14.58 sec. with a range 23.92 - 80.42 sec. There was a significantly high ALF mean score in patients with muscle power grade 3 than those with muscle power grade 4 or 5, patients with score (2) tenderness than those with score (1) or (0) and patients with knee effusion than those without. There was a higher ALF score in patients with varus or flexion deformity than patients without deformity. Radiologically, patients with X - ray grade 4 had ALF mean higher than those with grade 3, 2 or 1. A significant positive correlation was found between ALF score and age ($r=0.453^{**}$, P=0.002), weight (r=0.888 , P= 0.022), BMI (r=0.755, P=0.039) and VAS for pain ($r=0.307^{*}$, P=.045).

Conclusion: This study has demonstrated that a simple timed measure of locomotor function can be used as a measure of physical functioning. Knee OA patients with worse clinical condition (knee joint effusion, deformity, tenderness, weak quadriceps muscle strength, limited range of motion and high BMI) or more radiological damage revealed to be more functionally disabled and had high ALF score. The individual components of the ALF challenge the locomotor function of patients with knee OA, but are not so demanding that they cannot be completed. Consequently, the measure appears to offer the patient and clinician an appropriate, simple and convenient outcome measure in the treatment of knee OA.

Keywords:

Locomotor Disability – Osteoarthritis – ALF score.

Contents

Page

List of Tables

List of Appendixes

List of Figures

Page

Abbreviations

AAS	Adjusted activity score.
ACL	Anterior cruciate ligament
ACR	American College of Rheumatology.
ADAMTS	Aggrecanases disintegrin and metalloproteases with thrombospondin motifs
ADL	Activity of daily living.
AGEs	Advanced glycation end products.
AIMS	Arthritis impact measurement scale.
ALF	Aggregated locomotor function score.
ANOVA	Analysis of variance
BMI	Body mass index.
CMC	Carpometacarpal joint
COL2A1	Chains of type I procollagens.
COX-2	Cyclooxygenase-2.
DIP	Distal interphalaneal joints.
DRUJ	Distal radioulnar joint.
ECM	Extracellular cartilage matrix.
ESR	Erythrocyte sedimentation rate
HAP	Human activity profile scores.

HAQ	Health assessment questionnaire.
HRQoL	Health related quality of life.
IADL	Instrumental activities of daily living.
IL	Interleukin.
JSN	Joint space narrowing.
K & L	Kellgren & Lawrence
KOOS	Knee injury and osteoarthritis outcome score.
LCL	Lateral collateral ligament
LEAS	Lower-extremity activity scale.
LM	Lateral meniscus
MAM	Manual ability measure.
MAS	Maximal activity score.
MCL	Medial collateral ligament
MCP	Metacarpophalangeal joints.
MM	Medial meniscus
MMPs	Matrix metalloproteinases.
MPQ	McGill pain questionnaire.
MRI	Magnetic resonance imaging.
MSCs	Adult mesenchymal stem cells.
MTP	Metatarsophalangeal.

NHP	Nottingham health profile.
OA	Osteoarthritis
OAKHQOL	Osteoarthritis knee and hip quality of life questionnaire.
PASE	Physical activity scale for the elderly scores.
PAI-1	Plasminogen activator inhibitor-1.
PCL	Posterior cruciate ligament
PIP	Proximal interphalangeal joints.
ROM	Range of motion.
SD	Standard deviation.
SEV	Standing extended view.
SF-36	Short form 36.
SPSS	Statistical package for the social science
STT	Scaphotrapezium-trapezoid joint.
TIMP	Tissue inhibitor of metalloproteinases.
TUG	Timed up and go test.
US	Ultra-sonography
US	United States
VAS	Visual analogue scale.
WHO	World health organization.

WOMAC	Western Ontario and McMaster Universities Osteoarthritis Index.
WOMAC-PF	Western Ontario and McMaster Universities Osteoarthritis Index physical functioning subscale scores.

INTRODUCTION

OA, the most common form of arthritis, is a degenerative joint disease characterized by joint pain and dysfunction caused by a progressive and irreversible loss of articular cartilage **(**Boileau et al., 2008).

OA is the most common form of arthritis, affecting nearly 27 million Americans or 12.1% of the adult population of the United States (Lawrence et al., 2008).

OA is one of the common chronic medical conditions encountered with old age, and a major cause of disability which leads to a decline in physical function that may ultimately require joint replacement surgery (Powell et al., 2005).

OA can be defined by symptoms or pathology. The pathology of osteoarthritis involves the whole joint in a disease process that includes focal and progressive hyaline articular cartilage loss with concomitant changes in the bone underneath the cartilage, including development of marginal outgrowths, osteophytes and increased thickness of the bony envelop (bony sclerosis). Many people with pathologic and radiographic evidence of osteoarthritis have no symptoms. From a clinical perspective, the most compelling definition of disease is one that combines the pathology of the disease with pain that occurs with joint use (Jordan et al., 2000).

Radiographic OA is usually defined as the presence of a definite osteophyte on the radiograph. Some subjects with radiographic OA have symptoms and others do not. Symptomatic OA is usually defined as the presence of symptoms and radiographic evidence of OA (Felson, 2004).

Epidemiological studies have estimated that symptomatic radiographic knee OA affects 10% of adults >55 years of age (Peat G et al.,2001).

Clinically, the condition is characterized by joint pain, tenderness, limitation of movement, crepitus, occasional effusion, and variable degrees of local inflammation (Dieppe, 1999).

Osteoarthritis is one of the leading causes of chronic disability. Recent estimates suggest that symptomatic knee OA occurs in 13% of persons age 60 and over. The prevalence is expected to increase further as the population ages (Dieppe and Lohmander, 2005).

The most widely used classification schemes for OA are based on the radiological appearance of the joint. The radiological hallmarks of OA are osteophyte formation, joint space narrowing, and sclerosis and cyst formation. Severity may be graded based on the 0-4 scale developed by Kellgren and Lawrence (Kellgren and Lawrence, 1957).

Assessing the relationship between radiographic features of knee OA, pain and disability is complex. Previously, a lack of correlation between symptoms and radiographs has been found probably related to the joint views taken (Hannan et al., 2000).

Objective assessment of locomotor function of timed walking, stair ascent and descent and transferring to and from a chair has been used by several investigators in the field of knee osteoarthritis (Van Baar et al., 1998).

Recently the times of these individual activities have been aggregated to form one timed sore. By aggregating the time of the activities, a better objective assessment of the patient overall functional capabilities can be obtained (McCarthy et al., 2004).

Aim of the work

To correlate the aggregated locomotor function score with the clinical and radiological variables in patients with knee OA.