

2016 no, 1

## Abstract

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- Rehabilitation & Nordic Walking

R. Marutani

Abstract:

Nordic Walking is one of sports and its roots are Nordic Ski. And walking with two poles is used for the training of Nordic skier in summer time. In 1980's, the walking with two poles was enjoyed as a recreation, and named Nordic Walking (NW) in 1997. In Japan, the NW is enjoyed from 1999 for the healthy people and in 2010's, the NW was used for handicapped people. NW is useful for the people suffered from various diseases. The narrow sense of rehabilitation for the NW trainings are as follows. 1) Joints and bone diseases and spine diseases; rheumatoid arthritis, fractures of lower extremity, Osteoarthritis of knee joints or hip joints and Spinal canal stenosis etc. Two poles are to provide a posture corrective tool for correcting the bad posture of a body to a right posture. Poles are low impact for the body. 2) Parkinson Disease and intractable neurological diseases; fore posture, scoliosis, brachybasia and etc. Are improved. 3) Chronic obstructive pulmonary disease (COPD); Upper extremities are used and the respiration is eased. 4) Diabetic mellitus, hyperlipidemia, hypertension and etc. ; the symptoms and laboratory data are improved. NW for prophylaxis approach, 1) a preventive measure of life style related disease ; Use your upper extremity, good posture and NW increase energy expenditure 20 % up.

2) preventive care, esp. for senior citizens ; dementia, aged people and locomotive syndrome ; recreation and muscle training 3) correct the posture and dieting 4) Walking training for children ; To improve the flatfoot.

Conclusion: NW is good training not only for the healthy people but also handicapped person.

Key words : Rehabilitation, Nordic Walking, Disability, Handicap, Rehabilitation & Nordic Walking

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- The Japanese Style Nordic Walking and Cardiovascular Disease

M. Kawauchi

The Japanese style Nordic walking is a walking method with two poles for the purpose of improvement of the gait balance especially in elderly persons and patients in rehabilitation. The feasibility of Nordic walking on heart rate, blood pressure, exercise capacity, maximum oxygen capacity, and QOL in the patients with atherosclerotic disease, diabetes mellitus, obesity, hypertension, coronary artery disease has been confirmed. Nordic walking was also reported to increase the walking capacity of arteriosclerotic patients with intermittent claudication. The Japanese style Nordic walking was reported more effective and useful in exercise prescription for cardiovascular patients.

Keywords: Japanese Style Nordic Walking, Cardiovascular disease, Coronary artery disease Intermittent claudication,

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- The Japanese Style Nordic Walking

K. Sato, S. Suzuki, I. Sakurai, M. Kawauchi

Abstract

The European style Nordic walking is walking with two poles in a cross-country ski style. The arms should swing from your shoulder. Pushing the ground behind your body with backward-angled poles results in propulsion forward.

The Japanese style Nordic walking is also walking with two poles, and improves the balance of gait. As you step your foot forward, you extend forward the pole in your contralateral hand and plant rectangularly on the ground which is as forward as your foot in front. The Japanese style Nordic walking is good walking style for the elderly persons and patients in rehabilitation program.

Keywords : Nordicwalk, Japanese Style

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- Infants of Nordic Walking -Play and walk-

S. Suzuki, K. Sato, I. Sakurai, M. Kawauchi

Abstract:

The purpose of this study is to investigate the development of Nordic walking style in infants. We observed how to play with Nordic pole. At this time, Sequential photos of walking and gyro sensor studies during Nordic walking and Normal gait were recorded in six infants aged from 423 to 1643 days. Also, the developmental changes were followed in an infant. The forward acceleration was significantly highly observed ( $p < 0.05$ ) in Nordic walking. And, the walk tempo stayed unchanged. In the photo from the front, Spine posture in frontal view photo was close to upright during Nordic walk.

Keywords : Nordic Walk • baby type walk • infants • play

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- NW effect on the body height in healthy subjects and neurovascular patients.

H. Onishi, M. Hukano, E. Fujimoto, H. Onizuka, Y. Jinno, M. Kawauchi

Abstract

Subject: Thirty healthy subjects aged 24.  $6 \pm 3.0$  year old (male 19, female 11) and Twenty neurovascular rehabilitation patients aged 70.  $1 \pm 12.0$  year old (male 15, female 5) were included in the study.

Methods: Every subject/patient underwent Nordic walking program, five minutes for five days. Body height was measured just before the program and the sixth day. Wilcoxon test was employed for statistical analysis and p-value less than 0.05 was considered as significant.

Results: Twenty-one out of thirty healthy subjects ( $p < 0.05$ ) increased their body height, 0.29cm in average. Sixteen out of twenty patients ( $p < 0.05$ ) increased their body height, 0.41cm in average.

Conclusion: NW is feasible to increase the body height in young healthy subjects as well as elderly neurovascular patients.

Keywords : body height, Nordicwalking, neurovascular patients

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- Importance of Immediate Pulse Rate Measurement after the Exercise

T. Aeba, K. Hayashi, M. Kawauchi

Abstract

Purpose: A proper exercise intensity is required to perform an aerobic exercise, and also it is necessary for the patients with life-style related diseases such as heart disease. Although there are many ways to evaluate the physical activities, heart rate monitor (= pulse rate) is extremely important. However, when the exercise is over, the pulse rate rapidly decreases. Therefore, you need to measure the pulse rate immediately after the exercise, otherwise, the proper confirmation of the heart rate for the exercise is difficult.

Methods: fourteen patients, (10 men, 4 women; age from 42 to 86 years), without any arrhythmias, such as atrial fibrillation, were investigated. All of them were undergoing rehabilitation programs, including 2 heart diseases, 8 cerebrovascular diseases and 4 locomotive diseases. We measured the pulse rate (1) immediately after discontinuation of the walking and (2) after the walking sitting on the chair in the rehabilitation unit.

Result: It was confirmed that the exercise load has occurred by walking. Comparing with these two different measurement conditions, there were a significant decrease in the pulse rate between two conditions.

Conclusion: In order to perform a proper walking exercise, it should be necessary to measure a pulse rate immediately after discontinuation of the exercise.

Key Words: proper exercise intensity, pulse measurement conditions, Nordic Walk

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- Unilateral Use of Nordic Pole on Patients with Stroke -Comparison with T cane-

Y. Hirota, Y. Saito, K. Koze

Abstract

Purpose: The purpose of this study is to determine the feasibility of unilateral use of Nordic pole for Stroke patients.

Methods: Eight patients with Stroke were enrolled in the study. Ten-meter-walk tests with comfortable walking speed were carried out with unilateral.

Nordic pole and with T cane. Tests were repeated twice for each device and the average values were employed for the statistical analysis with Wilcoxon signed -rank test and the p-value less than 0. 05 was defined as significant.

Results: With the use of Nordic pole, the number of steps for ten meters were 21. 2 in average and significantly less than those with T-cane, which were 23. 4 in average. Ten-meter-walk times were shorter with Nordic pole (15. 5sec in average) than those with T-cane. But the difference was not significant.

Conclusion: The feasibility of unilateral use of Nordic pole was confirmed in patients with stroke.

Keywords: Unilateral Nordic pole, T-cane, Gait exercise

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## 2016 no, 2

- Nordic Walking for Parkinson Disease

R. Marutani

There are many merits of Nordic Walking (NW). I use the Nordic Poles for the Parkinson Disease patients' rehabilitation. The PD patients have forward-bent posture and scoliosis. The NW helps to improve this posture. The PD patients walk with short steps and the pole's width is narrow. The PD patients have frozen gait. The speed of walking becomes fast, when the patients come near the object. The PD patients are not good at going around the sharp curve. When I supervise the PD patients, I always check the patients walking and make an adjustment their walking one by one. I think the most important point of the NW rehabilitation for PD Patients is to walk using their legs and two Nordic Poles. Thereby the posture of the patients improve and decrease the risk of the fall.

Key words: Nordic Walking, Parkinson Disease, Rehabilitation

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- The characteristic movement of gravity center during Japanese style Nordic walk

-The vertical movement and lateral deviation of the gravity center-

S. Suzuki, I. Sakurai, K. Sato, M. Kawauchi

(Medical Scientific Committee, Tokyo Prefecture Nordic Walk League, Tokyo, Japan)

Abstract:

The purpose of this study is clarify the movement of gravity center during the Japanese style Nordic walking. The movement of gravity center during free walking and Nordic walking was analyzed by 3D motion Analyzer in nine healthy male subjects. The vertical movement of gravitational center increased during Nordic walk more than free walking ( $p < 0.05$ ). The lateral deviation was also increased but not significant.

Key words: Japanese style Nordic walking, 3D motion analysis, center of gravity

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- Reverse Pendulum model of the Nordic walk-Comparison of walking and Nordic walk-

I. Sakurai, K. Sato, S. Suzuki, M. Kawauchi

(Medical Scientific Committee, Tokyo Prefecture Nordic Walk League, Tokyo, Japan)

Abstract:

The gait characteristics of Japanese style Nordic walking and free walking were compared in this study. Inverse pendulum with a walking fulcrum on the ground was analyzed by 3D motion Analyzer in nine healthy male subjects. In the late walking phase, subjects bent more forward during Nordic walking than free walking ( $p < 0.05$ ). This resulted in production of the large driving force with Nordic walking.

Key words: Japanese style Nordic walking, Inverse pendulum

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## 2016 no, 3

### ● The effect of reduction of the burden to lower limbs in Nordic Walking

Y. Yoshimura, K. Ono, M. Ise

#### Abstract:

Purpose: The purpose was to investigate the effectiveness of NW as gait exercise for patients with gait disturbance by measuring muscle activities in the lower extremities and ground reaction force during Nordic Walking(NW).

Method: The 10 healthy males performed walking(W) and NW in each three trials. The cadence was fixed at 110 per min. When they performed walking tasks barefoot on 10m walkway, ground reaction force and muscle activity were measured. Electromyography was used to record the muscle activity of rectus femoris(RF), vastus medialis(VM), tenor fasciae latae(TFL), biceps femoris(BF), tibialis anterior(TA) and lateral gastrocnemius(LG) muscles in fifth stance. Average muscle activity during NW were compared with during W.

Result : The muscle activity of TFL and TA, LG were significantly increased during NW compared with during W.

Conclusion: It was suggested that NW reduces the load in lower extremities compared with W. In terms of protection for joint

in lower extremities, it was speculated that NW would be beneficial as gait exercise for some individuals with osteoarthritis and rheumatoid arthritis.

Key words: Nordic walking, Ground reaction force, Muscle activities

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### ● Nordic Walking Effect on Maximum Walking Distance of Patients with Compression Fracture.

- In Comparison with T-cane -

H. Onishi, M. Hukano, E. Fujimoto, Y. Jinno, M. Kawauchi

The differences of maximum walking distance between Nordic walking and T-cane walking were compared. Twenty three in-hospital patients with compression fracture under rehabilitation program were included in this study. All the patients

were older than 65 years and 83.2 years-old in average. In twenty-two patients out of 23, maximal walking distance were elongated with Nordic walking pole than those with T-cane, 325.6m vs 238.8m in average ( $P < 0.01$ ).

Keywords; compression fracture, Nordic walking, T-cane

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### ● Nordic Walking Effect on Maximum Walking Distance of Patients after Artificial Knee Arthroplasty.

- In Comparison with T-cane -

T. Ttujimura, H. Onishi, Y. Jinno, M. Kawauchi

#### Abstract:

The differences of maximum walking distance between Nordic walking and T-cane walking were compared. Nineteen in-hospital patients under rehabilitation program after total / unicompartmental knee arthroplasty were included in this study. All the patients were older than 70 years and 80.2 years-old in average. Total measurements were 25 times within 19 patients. Six patients were measured twice. In twenty one measurements out of 25, maximal walking distance were elongated with Nordic walking pole than those with T-cane, 176.4m vs 112.8m in average ( $P < 0.01$ ).

Keywords; total knee arthroplasty, unilateral knee arthroplasty, Nordic walking, T-cane

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- Investigation of immediate effect in Nordic walking

~Focusing on sitting balance~

Y.Hirota, T.Komatsu, S.Ooba, N.Hagiwara, A.Kudo, T.Tomita, Y.Motoya, K.Abe, H.Nomura

Abstract :

Purpose : The purpose of this study was to determine the effect of gait exercise with Nordic Walking(NW) with stroke.

Methods : 23 stroke patients participated in this study. The pressure by sitting central biggest displacement and Advancing all at once balance test was carried out each twice for Walking aid use and NW. The walking style used Japanese style. Statistical analysis set the significant level to less than 5 % using Wilcoxon signed-rank test to sitting central biggest displacement and Advancing all at once balance test.

Results : The sitting central biggest displacement admitted decrease significantly more than Walking aid use(Walking aid : 7.3cm, NW : 8.2cm,  $p<0.05$ ). The Advancing all at once balance test displacement admitted decrease significantly more than Walking aid use (Walking aid : 1.8score, NW : 2.8score,  $p>0.05$ ).

Conclusion : The utility of the walking exercise by NW was suggested more than Walking aid.

Key words: Nordic walking , Sitting balance , Gait exercise

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- Inclination and Rotation of the Head during Nordic Walking.

- In Comparison with T-cane -

N.Aida, Y.Kurachi, T.Nakajima, T.Sugiyama, Y.Tamagawa, K.Ebiya, R.Nakano, I.Sakurai, K.Sato, S.Suzuki

Abstract:

Inclination and rotation of the head were compared between Nordic walking and T-cane walking. Two-dimensional analysis with video recording were held in seven healthy subjects. In Nordic walking inclination and rotation of the head were smaller

than those with T-cane walking,  $p<0.05$ ,  $p<0.05$ .

Keywords; inclination of the head, rotation of the head, Nordic walking

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- The Effect of the Nordic Walking in the Patient with Spinal Cord Injury. A Case Report.

H.Onishi, E.Fujimoto, Y.Jinno, M.Kawauchi

Abstract:

The patient was 52 year-old male with L1 spinal cord injury to accidental fall of hang glider. Nordic walking in the rehabilitation program were improved the balance during gait exercise and elongated the walking distance.

Keywords; spinal cord injury, Nordic walking

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- The Effect of the Nordic Walking in the Patient after multiple orthopedic surgery. A Case Report.

S.Suzuki, I.Sakurai, K.Sato, M.Kawauchi

Abstract:

The three months Nordic walking program improved the posture of the female patients with right total knee arthroplasty, left bipolar arthroplasty and lumbar spondylosis.

Keywords; multiple orthopedic surgery, Nordic walking

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