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The Society of Asian Rehabilitation Science

13th International Meeting of Asian Rehabilitation Science in Japan

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International University of Health and Welfare Otawara Campus, Japan

Chair: Professor Takamichi Taniguchi (Japan)

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Special Lecture-1

Current Educational Situation of Occupational Therapy Relationship between Asia and IUHW

Takamichi Taniguchi

International University of Health and Welfare

The International University of Health and Welfare (IUHW) was founded in 1995 with the objective of nurturing health and welfare specialists and raising their status. Since then, our highly specialized education has produced about 26,000 graduates. At the time of its establishment IUHW had one school and five departments, and since then we have expanded to 10 schools and 25 faculty and departments, in addition to a graduate school, spread over six campuses.

The founding principle of IUHW that we have followed since our establishment is “building a society with mutual respect and support,” which was advocated by our first President, Fujio Ohtani, who strove to protect human rights throughout his life. In accordance with that principle we have developed the educational environment so that our campuses also include health and welfare facilities for the elderly and disabled, giving students the opportunity to have direct contact with people who have special needs and thus nurture loving-kindness in their everyday experiences naturally.

Fundamental Principles of IUHW

- 1.University focused on well-balanced individuals with a solid sense of humanity
- 2.University strongly connected to and fully open to the community
- 3.University directed towards the attainment of global standard

The IUHW Scholarship System is one of the programs that achieves this Fundamental Principle No.3.

The Occupational Therapy Department has been accepting international students since 2000.

Since then, we have started accepting international students not only in undergraduate education but also in graduate school, and we are accepting international students from Vietnam and Myanmar.

Some have obtained national qualifications for occupational therapists in Japan. One of the Chinese students got a Ph.D. I am very proud of this. We are also developing an educational program for Vietnamese physical therapists in collaboration with Vietnamese graduates.

This society reports on the international cooperation of the Department of Occupational Therapy, International University of Health and Welfare.

Special Lecture-2

Current Status and Prospects of Occupational Therapy in Vietnam

Do Ngoc Tung

Viet Nam Assistance for the Handicapped (VNAH)

The Rehabilitation has been established and operated in Vietnam for more than 40 years. However, education and training activities, and service provision only focus on Physiotherapy. The need for Occupational Therapy (OT) of people in health facilities and in the community is very enormous while Vietnam does not have official/formal and methodical training of OT human resources although some rehabilitation departments in large cities already provide basic OT services in hospitals. Before 2017, training in OT was integrated into the Bachelor of Physiotherapy program at a number of universities such as University of Medicine and Pharmacy Ho Chi Minh (UMP HCMC) and Hai Duong Medical Technical University (HMTU). This reduces the effectiveness of the patient's rehabilitation treatment and affects the patient's ability to independently perform ADLs and IADLs. Since 2017, Medical Committee Netherlands-Vietnam (MCNV) has cooperated with UMP HCMC and HMTU with professional support from Manipal University - India to organize the first full-time OT bachelor's degree program (full) -time and work-study). At the same time, Vietnam Assistance for the Handicapped (VNAH) also cooperated with Curtin University - Australia to organize 10-12 month training courses specializing in OT for doctors and technicians. Up to now, Vietnam has 57 OT graduates and 188 OT students attending medium-term courses of 10-12 months. In the coming time, not only schools/university in the public sector but also the private sector will begin to deploy OT bachelor's training and gradually move towards autonomy in training.

Keywords: rehabilitation, occupational therapy, Vietnam

Special Lecture-3

Current Status and Prospects of Occupational Therapy in China

Huang Fubiao

Department of Occupational Therapy, China Rehabilitation Research Center, China

Faculty of Rehabilitation, Capital Medical University, China

Along with social progress and economic development, occupational therapy has made great advances in China in the past three decades. It is mainly reflected in the following aspects: fast development of occupational therapy and more and more attention it receives; constantly enriched and improved professional connotation; continuous breakthroughs of occupational therapy education from scratch; rapid expansion of the team. There are currently over several thousand occupational therapy practitioners as well as 440 individual members of WFOT. The academic atmosphere of occupational therapy remains active. The occupational Therapy Professional Committee of The Chinese Rehabilitation Association held its 2019 Annual Conference before COVID-19, with 883 officially registered representatives and more than 1,000 actual participants. However, there are still challenges and shortcomings: the lack of occupational therapy norms and guidelines; the needs of improved concept of occupational therapy and clinical thinking; the obstacles faced in training occupational therapy talents; the far-reaching yet impeditive influences of traditional thinking and practice. The Occupational Therapy Committee of the Chinese Rehabilitation Association, an organization of occupational therapists in China, has done some work, including: revising the definition of occupational therapy; redefining the scope of occupational therapy; revising the occupational therapy process; drawing up new standards and norms related to occupational therapy; carrying out personnel training base construction, personnel training, education and guidance. The author believes that occupational therapy in China will develop in the following directions in the future (outlook): The urgent demand for occupational therapy will increase rapidly; the field of occupational therapy will expand and the direction will become clearer; the technological contents of occupational therapy will be enriched; the process of standardization and internationalization will be accelerated. This paper describes the development status, challenges and shortcomings of occupational therapy in China, analyzes the future development direction of occupational therapy in China, and puts forward corresponding suggestions for the development of occupational therapy in China.

Key words: Occupational Therapy, Current Status; prospective

Oral Presentation-1

Blood frailty markers related to cognition and walking ability

Masahiro Kameda, Hiroshi Kondoh

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[Background and Purpose]

As human society ages globally, age-related disorders are becoming common. Due to decreasing physiological reserves and increasing organ system dysfunction associated with age, frailty affects many elderly people, compromising their ability to cope with acute stressors. Frail elderly people commonly manifest complex clinical symptoms, including cognitive dysfunction, hypomobility, and impaired daily activity, the metabolic basis of which has been little understood.

[Methods]

We applied untargeted, comprehensive, LC-MS metabolomic analysis to human blood from 19 frail and non-frail elderly patients, who were clinically evaluated using the Edmonton Frail Scale, the MoCA-J for cognition, and the TUG for mobility.

[Results]

Among 131 metabolites assayed, we identified 22 markers for frailty, cognition, and hypomobility, most of which were abundant in blood. Frailty markers included 5 of 6 markers specifically related to cognition and 6 of 12 associated with hypomobility. These overlapping sets of markers include metabolites related to antioxidation, muscle or nitrogen metabolism, and amino acids, most of which decrease in frail elderly people. Five frailty-related metabolites that decreased have been previously reported as markers of aging, providing a metabolic link between human aging and frailty.

[Discussion]

Our findings clearly indicated that metabolite profiles would efficiently dissect the frailty from the others. Oxidative stress, resulting from diminished antioxidant levels, would be a key vulnerability for pathogenesis among frail elderly people, exacerbating illnesses related to human aging.

Oral Presentation-2

Timed Up and Go test with an obstacle: Proposal for measurement of anticipatory locomotor adjustments in older adults focused on the selection of route suitability

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[Background and Purpose] Timed Up and Go test (TUG) is a clinical tool widely used to evaluate balance and mobility. Given that planning a reasonable walking path outbound is critical to efficiently turning around a cone, leading to the quick completion of the task, performing the TUG test inherently involves anticipatory locomotor adjustments. To strengthen this nature of the TUG, we created a modified version of the TUG, called “Obs.-TUG,” in which an additional pole obstacle was located beside the cone. With this task, participants are requested to decide which of two possible routes—passing through an aperture between the obstacles or taking a detour—is better for quickly completing the task. We investigated whether older adults would be able to choose a suitable route in response to the width of an aperture (i.e., the wider an aperture is, the quicker individuals can complete the task when choosing to pass through an aperture).

[Methods] Thirty-eight older adults (75.0 ± 6.4 years) and twenty-five younger adults (25.2 ± 4.8 years) participated. Two poles 1 m tall were used to create an aperture (i.e., a cone was replaced with the pole). There were four aperture widths: 0.9, 1.05, 1.2, and 1.35 times the participant’s shoulder width. Participants performed the Obs.-TUG test under two conditions: free choice and forced choice. For the free-choice condition, participants were requested to choose the route that they believed would enable them to most quickly complete the task. For the forced-choice condition, they were instructed which route they were to select. When completing the Obs.-TUG task under the forced-choice condition, participants’ times when passing through an aperture and when taking a detour were compared to determine which route was most suitable for meeting the task goal for each aperture-width condition. Three-dimensional motion analyses were also conducted to compare gait speed and step length between older and younger participants.

[Results and Discussion] Older participants chose taking a detour significantly more frequently than younger participants in the free-choice condition. Comparisons of the time taken to complete the Obs.-TUG task under the forced-choice condition showed that, for wider apertures (1.2, 1.35 times), the time to complete the task was significantly faster when passing through an aperture than when taking a detour. These results suggest that older adults preferred choosing to take a detour to passing through an aperture, even when it would not make completing the task faster. Three-dimensional motion analyses showed that (a) the magnitude of the decrease in movement speed before taking a turn is significantly lower in older participants and (b) the number of steps with which the shortened step length for taking a turn was recovered to the normal step length was greater in older participants. These findings suggest that older participants are likely to select the route with the lower demand for locomotor adaptability, rather than the more suitable route in terms of the task goal.

Oral Presentation-3

Developing a virtual reality system to improve the collision-avoidance behavior when walking through an aperture for older adults.

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[Background and Purpose] Virtual reality (VR) could be used to set up a training protocol to improve one's collision-avoidance behavior. Kondo et al. (2021) developed a VR system for training older individuals to walk through an aperture in a manner that is both safe (i.e., no collision) and efficient (i.e., no exaggerated behavior to ensure collision avoidance). In the present study, we made several modifications to the VR system in terms of enriched feedback (vibratory stimulation for virtual collisions and the addition of positive feedback for successful trials) and gradual increase in task difficulty during training to strengthen the skill transfer.

[Methods] Nineteen older adults (74.4 ± 5.3 years of age) participated. They were randomly assigned to one of two training groups: the intervention group ($n = 10$) or the control group ($n = 11$). The experiment consisted of pre- and post-training tests in a real environment and training in a VR environment. During training, participants held a horizontal bar while stepping in place as if a VR image on the screen were moving in response to their stepping.

[Results and Discussion] Participants in the intervention group tried to pass a narrow aperture without collision while attempting to minimize their body rotation to avoid collision as much as possible. The criterion upon which the collision-avoidance behavior was regarded as successful became incrementally more demanding as participants successfully met the previous criterion. Participants in the control group passed through a very wide aperture, so that collision-avoidance behavior was unnecessary. A comparison between pre- and post-training test performances showed that, for older adults in the intervention group, the spatial margins became significantly smaller, while the success rate remained unchanged. For those in the control group, neither the spatial margin nor the success rate was improved. These results suggest that the three modifications made for the VR system contributed to improvement of the system and helped participants transfer the behavior learned from the VR environment to real walking.

Oral Presentation-4

Muscle activity of the hip adductor during bicycle ergometer

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[Background and Purpose] Previous studies on muscle activity in bicycle ergometer exercise have mainly investigated hip extensor muscle groups such as the gluteus maximus and hamstrings, and knee extensor muscle groups such as the quadriceps. Only a few studies have focused on the hip adductor muscle group. Therefore, we focused on the muscle activity of the hip adductor muscle group during bicycle ergometer exercise. The hip adductor muscles, the greater adductor and longus adductor, extend the hip joint at deeper hip flexion angles. On the other hand, those muscles flex the hip joint when the hip joint is extended. Therefore, we performed bicycle ergometer exercise while varying two parameters and measured the muscle activity of the hip adductor muscles. The two parameters were hip angle and pedaling position.

[Methods] The hip angle was adjusted by the height of the saddle. In the high saddle position, the hip angle is 90 degrees at the lower dead center. In the low saddle position, the hip angle is 110 degrees at the bottom dead center. Two pedaling positions were used. One is anterior, which places the second metatarsal head on the pedal axle. The other was posterior, 10 cm behind the anterior. The work rate of the bicycle ergometer exercise was 100 W and the rotational speed was 60 rpm. There were 14 subjects in this study. The study was approved by the Yamato university ethical committee (approval nr: 2021-3), and informed consent was obtained from all participants. We measured electromyograms of the hip adductor muscle, vastus medialis, semitendinosus, medial head of gastrocnemius, and tibialis anterior muscles during bicycle ergometer exercise. Active electrodes were used for the measurements. The joint angles of the hip, knee, and ankle joints were calculated by a motion analyzer. Based on the motion analysis results, the bicycle ergometer exercise was divided into flexion and extension phases. RMS values were calculated as the average muscle activity and normalized to the muscle activity during the maximum voluntary contraction. A three-way analysis of variance was performed for phase separation, hip angle, and pedaling position.

[Results and Discussion] Muscle activity of the hip adductor muscle group was 18.6% to 22.7%. The range of its activity was not significantly different between the flexion and extension phases, which suggested that it was active in a wide range of bicycle ergometer exercises.

This study has been made possible thanks to the contribution of the JKA (2021M-137).

Oral Presentation-5

Relationship between the chest and abdominal expansion and anterior-posterior motion of the chest and abdominal wall during inspiration

Yoshihiro Miyata, Masafumi Itokazu

Graduate school of International University of Health and Welfare

[Background and Purpose]

In Japan, there are many people with respiratory diseases who have not been examined; due in part to the COVID-19 epidemic, telemedicine using the Internet and camera sensors is considered important because it allows patients to be examined under non-contact conditions. The purpose of this study was to examine the validity of chest and abdominal wall motion measured with an infrared camera sensor (RGB-D camera) based on measurement of the chest and abdominal expansion and to observe temporal changes in chest and abdominal wall motion with respiration.

[Participants]

Participants in this study were 22 healthy adult males (age: 22.0 ± 2.2 , height: 173.5 ± 5.3 cm, weight: 68.9 ± 12.2 kg). The study has been approved by the Ethics Committee of the International University of Health and Welfare (approved no. 20-Io-141-2).

[Method]

Participants inhaled continuously up to 3000 ml with a syringe of 500 ml of air every 5 seconds from the maximal expiratory position in the supine position, 6 times with no spontaneous inhalation, and in a relaxed state. The anterior-posterior motion of the chest and abdominal wall were measured using Kinect v1 (Microsoft). The chest and abdominal expansion were monitored using a T.K.K. 3345 (Takei Scientific Instruments Co., Ltd.). The chest was measured simultaneously at the xiphoid process and the abdomen at the umbilicus. Data collection was performed six times between 500 ml and 3000 ml, and the average of the three seconds of each time was calculated. Spearman's rank correlation coefficient was calculated for the relationship between the anterior-posterior motion of the chest and abdominal wall and chest and abdominal expansion. One-way ANOVA and the Holm method or Friedman test and the Steel-Dwass method were used to test for differences in each measured interval. The significance level was set at 5%.

[Results]

The correlation coefficient between the chest wall motion and expansion was 0.61, and that between the abdominal wall motion and expansion was 0.66, both have accordingly shown a significant association. Abdominal wall motion showed a continuous significant increase with a stepwise increase in inspiratory volume.

[Conclusion]

This study suggests that it is possible to measure the chest and abdominal wall motion during inspiration with an RGB-D camera, and that motion were significantly related to the expansion motion. In term of the measurement of chest wall motion, it is considered necessary to measure and study the lateral movement of the thorax with changes in inspiratory volume.

Oral Presentation-6

Effect of Online Rehabilitation Training for Patients with Stroke During COVID-19

: A Pilot From Vietnam Assistance for The Handicapped

Nguyen Linh Lan, Do Ngoc Tung, Nong Thi Ngoc Lan

Vietnam Assistance for the Handicapped (VNAH)

[Background and Purpose]

From mid-2021, the complicated situation of the COVID-19 epidemic caused hospitals and health centers in Vietnam to have to convert part or all of their functions to COVID-19 prevention and treatment. Therefore, the provision of Rehabilitation services for patients at the hospital or people with disabilities in the community is almost suspended. This difficulty leads to an interrupted recovery process as well as an additional burden on the family and society. Stemming from these concerns, VNAH's rehabilitation technician group conducted a survey of the actual needs of patients and piloted "Online rehabilitation training for patients with stroke" via the ZAVI app.

[Method]

This training form was piloted in August and September of 2021, starting with 5 patients and officially deployed from October 2021 until now. The implementation process consists of 3 steps: contacting the patient, assessing the condition and determining the need; instructing the patient in need how to install and use ZAVI and the rules in the training session; introducing the purpose of the session and showing the patient an example of a session. The session usually lasts 45-60 minutes (twice a week), revised from the FAME program's documentation, and includes 3 steps of warming up, main exercises, stretching and cooling down.

[Results and Discussion]

Evaluations are done every 2 months including the 10MWT, ABILHAND, Barthel index. The most recent evaluation in January 2022 showed that 100% of patients improved on all indicators. In the future, it is recommended to combine many forms of training to create the best conditions for patients during the recovery process when the epidemic situation still has many unpredictable developments.

Keywords: stroke, online training, rehabilitation