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Contents

Effect of auricular acupressure in smoking cessation among young adults

Estella Grace M. Viguilla, PTRP, MSAHP

Abstract

Introduction Auricular acupressure is one of the alternative modalities used for relieving withdrawal symptoms caused by substance abuse and addiction. However, its efficacy remains inconclusive due to scarcity of evidence and further exploration of its effect is needed. This study aimed to determine the effect of auricular acupressure in smoking cessation among young adults.
Methods This was a quasi-experimental study involving adults aged 18 to 45 years at the College of Allied Rehabilitation Sciences. Thirty eligible participants were recruited and included in the study. The Brief Questionnaire of Smoking Urges was used to assess the cravings to smoke and the Fagerstrom Test for Nicotine Dependence, to measure the level of nicotine dependence. The secondary outcome measured was the number of cigarettes smoked per day.
Results Repeated Measures ANOVA showed a significant decrease in the level of craving, cigarette consumption and nicotine dependence at the end of the three-week intervention that remained consistent until the fourth week.
Conclusion This study suggests that auricular acupressure may be an effective intervention for smoking cessation by decreasing the level of cravings to smoke, consumption of cigarette and nicotine dependence that may lead to complete abstinence.

Key words: Auricular acupressure, smoking cessation

Smoking ranks as the second major cause of premature death in the world and remains as one of the biggest threats to current and future world health.[1, 2] Health risks related to smoking include lung problems, malignancy and cardiovascular diseases. It was estimated that 8.8% of deaths worldwide every year was associated with its use.[3]

In the Philippines, around 28.3% of the population aged 15 years old and above has smoked cigarettes.[4] A Metro Manila survey revealed that 65% of cigarette smokers were in the productive age group 22 to 65 years.[5] Around 47.8% Filipino smokers attempted to quit and only about 4.5% were successful.[4] Long-term quit rates are low and smokers typically need four or more quit attempts before they achieve complete cessation.[6] A younger age of exposure to smoking is associated with a greater likelihood of maintaining smoking behavior. This simply illustrates the powerful effects of tobacco addiction.

Difficulty in achieving complete cessation from cigarette may be attributed to the reinforcing properties of nicotine and its association with learning and behavior in humans. Studies showed that nicotine meets the criteria for drug dependency in that, it promotes compulsive use and reinforces its own use.[7] The physiological dependence on nicotine can be triggered by its "positive" effects, including pleasure, arousal and reduction of anxiety and tension.[8] Sudden smoking cessation may produce behavioral adverse effects including irritability, depressed mood, increased anxiety, craving for tobacco and difficulty concentrating.[9] The negative emotional affect associated with nicotine withdrawal represents the powerful stimuli for relapse of tobacco use and difficulty in quitting.[10]

Currently available interventions for smoking cessation include behavioral therapy, nicotine replacement, and nicotine antagonists. Their limited efficacy and increased health risks have led to the exploration of the role of alternative medicine. Among the alternative medicine modalities practiced today, acupuncture and acupressure are the most popular therapies in different countries including the Philippines.[11] These modalities originated from China and have been deeply integrated, through culture and history, into virtually all countries in Southeast Asia.[12]

The stimulation of certain anatomical points on the surface of the ear has been reported to have an effect on the body organs, systems and functions. Based on a study in 2002, acupuncture has been reported to alleviate uncomfortable symptoms associated with substance withdrawal and can therefore be used as part of an early intervention.[2] Management using auricular acupuncture may cause patients to become more cognitively and emotionally receptive to the traditional psychosocial interventions.[13] In the Philippines, acupressure gained more acceptance than acupuncture since massage or pressure is more commonly practiced in its tradition.[14] Auricular acupressure is commonly used in lieu of indwelling acupuncture since it provides the same benefits and has the advantages of being non-invasive, simple and easy to apply.[15] However, due to the dominance of western medicine, there is scarcity of clear scientific evidence dealing with the effect of auricular acupressure for smoking cessation among young adults. Thus, this study aimed to determine the effect of auricular acupressure on smoking cessation among young adults.

Methods

This quasi-experimental study involved students and employees at the UERMMMCI-Clinic and Training Center from November 2011 to January 2012. Subjects underwent auricular acupressure for three weeks. Craving to smoke, nicotine dependence and daily cigarette consumption were measured before and after the intervention.

Two instruments were used to measure the primary outcomes: the10-item Brief Questionnaire of Smoking Urges (BQSU) and the 6-item Fagerstrom Test for Nicotine Dependence (FTND). The BQSU consists 10 'agree-disagree' items with a 7-point Likert scale (1 as strongly disagree to 7 as strongly agree).[16] The BQSU is divided into two factors: the first factor covers the need to smoke for relief or intention or desire to smoke and consists of items 1, 3, 6, 7 and 10 which while the second factor covers positive desire to smoke for reward or relief of negative affect and urgent desire to smoke and consists of items 2, 4, 5, 8 and 9.[17] It is reliable in measuring multi-dimensional features of self-reported craving and includes the different features of craving such as anticipation of relief of nicotine withdrawal, anticipation of positive outcomes of smoking, desire to smoke and intention to smoke.[18] Studies showed that this craving measure is sensitive to abstinence with excellent reliability regardless the setting of administration.[19]

The FTND was developed to lessen the tobacco-attributable morbidity and mortality by implementing appropriate smoking cessation intervention based on physical dependence to nicotine. This questionnaire has been demonstrated to predict success in smoking cessation and distinguish between light and heavy smokers.[20] Research has shown that the FTND is appropriate for clinical practice because it includes an assessment of behavior on dependence that may be pertinent for smoking cessation.[21] Each option for every item has equivalent points; the higher the score, the greater is the addiction to nicotine.[22]

The FTND and BQSU underwent test-retest reliability by asking a certified Filipino professor to translate each item to vernacular (Tagalog). These questionnaires were re-translated into English by a certified English professor to ensure reliability. Content Validity Ratio (CVR) of the two questionnaires were done to determine whether the questions/items were essential and valid. This was done by asking five professionals to validate the questionnaire and results revealed a CVR of 0.6 meaning that the items of the questionnaires were essential and valid. A secondary outcome measured was the number of cigarettes smoked per day.

Potential subjects who met the following criteria were recruited by purposive sampling: 1) adults 18 to 45 years old, 2) minimum score of 21 points in the Mini Mental State Examination to avoid the confounding effects of cognitive problems (e.g. memory deficits associated with addiction), 3) ability to read and write, and to understand and complete the consent form, 4) absence of other medical conditions such as cardiovascular disease or

dermatological conditions affecting the auricular region, and 5) minimum score of 5 points in Fagerstrom Test for Nicotine Dependence. Participants were not required to be motivated to stop smoking. Participants were excluded if they were: 1) currently taking anti-depressant medications or pharmacologic interventions that would alter their mood or behavior, and 2) taking any nicotine replacement therapy or undergoing any behavioral therapy related to smoking addiction.

Thirty participants were recruited and screened. They were asked to voluntarily sign an informed consent; demographic information, age began smoking, and number of unsuccessful quit attempts were gathered. They were asked to answer the FTND, BQSU and document the number of cigarettes consumed per day for one week prior to the actual procedure. Acupressure was administered using the standard protocol by National Acupuncture Detoxification Association (NADA).[23] An experienced certified acupuncturist was hired for the administration of treatment. All participants were treated using the five auriculo-acupressure points (Figure 1) known to be effective for smoking cessation: Sympathetic, *Shen Men,* Kidney, Liver and Lung. The Sympathetic is known to have a strong analgesic, relaxant effect and dilates blood vessels causing to balance the sympathetic nervous system. The *Shen Men* point is believed to generally alleviate anxiety and nervousness and produces a calming, relaxing effect. The Kidney point is associated with growth, development, reproduction, courage, intelligence and the aging process; it is also believed to stimulate physiologic and hormonal functions and main point to reduce drug cravings. The Liver point is associated with resolving anger and aggression and with keeping both emotions and the body's systems moving smoothly. It is also responsible for planning, vision and insight. The Lung point is used for addiction related lung tissues and organ for detoxification. It is also involved in immunity and protecting the body from disease, and associated with the grieving process, inspiration, respect and connection with the heavens.

Auricular acupressure was administered using 1mm magnetic ear pellets in an adhesive patch. The pellets were changed every week or if they were dislodged. Participants were instructed to press each point for at least one minute whenever urge to smoke occurred. The adhesive patch with ear pellet was maintained for five consecutive days in a week for 3 successive weeks on both auricles. Participants were asked to continuously document the number of cigarettes consumed per day for the whole period of treatment. Every 5th day, participants were again asked to answer the FTND and BQSU. After the intervention, participants were asked to document the number of cigarettes consumed for one week and to answer the FTND and BQSU.

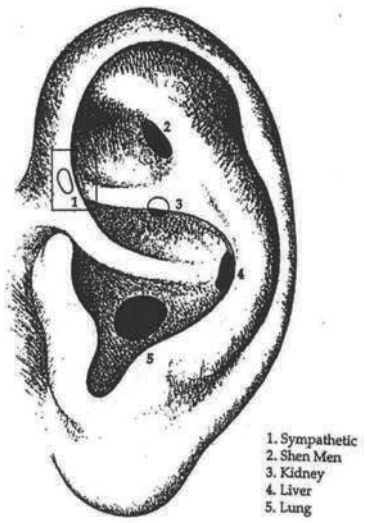

Figure 1. NADA ear protocol.

The data collected from all of the participants were encoded into a computerized database using Microsoft Excel 2007 and were analyzed using SPSS Statistics version 19 for Windows. Baseline characteristics of participants were determined. Measures of central tendency (mean) and standard deviation of FTND and BQSU scores, and number of sticks consumed per day was likewise calculated. Repeated measures ANOVA was used to determine the association of the number of cigarettes taken by the participants, BQSU (factor 1 and factor 2) and FTND (moderate and high group) during pre-test until week 4. Likewise, bar graphs and line graphs were used to show the change in performance of each participant every week during the course of the intervention.[24]

Results

Thirty students and employees who satisfied the inclusion criteria, had none of the exclusion criteria,

and gave their consent, were included in the study. Their characteristics are shown in Table 1. There was a significant reduction in craving or urge to smoke for relief on the third and fourth weeks ($P < 0.05$, repeated measures ANOVA) as shown in Table 2. There was a also a significant reduction in craving to smoke for reward on the third and fourth weeks ($P < 0.05$, repeated measures ANOVA) as shown in Table 3. Table 4 shows a significant reduction in the number of cigarettes consumed per day from the first week up to the fourth week from 18 sticks per day to 10-11 sticks per day ($P < 0.05$, repeated measures ANOVA).

Before intervention, 18 (60%) subjects were assessed to have high degree of dependence to nicotine while the remaining 12 (40%) were moderately dependent. Eight subjects (27%) classified as high dependence at baseline remained high after the whole treatment program, while three (10%) and seven (23%) of them became moderate and low dependent to nicotine, respectively. Eight subjects (27%) who were categorized to have moderate dependence to

Table 1. Demographic characteristics of participants.

Characteristics		Data Mean	SD
Gender			
Male	16		
Female	14		
Age (years)		29	± 7.68
Duration of smoking (years)		13	± 7.00
Unsuccessful Quit Attempts		1.6	± 2.62
Average # of cigarettes consumed/day		18.1	± 5.02
FTND grade 6.0 + 1.10			
BQSU			
Factor 1 (need to smoke for relief)		19.6	± 8.85
Factor 2 (need to smoke for reward)		18.6	± 8.46

Table 2. Craving for nicotine for relief as measured by BQSU (Factor 1)

	Mean	± SD	Baseline Mean	± SD	*t* value
Week 1	17.9	± 8.89	19.6	± 8.85	0.356
Week 2	18.0	± 9.63	19.6	± 8.85	0.436
Week 3	15.6	± 9.20	19.6	± 8.85	0.038*
Week 4	15.6	± 8.81	19.6	± 8.85	0.024*

*p value <0.05

Table 3. Craving for nicotine for reward as measured by BQSU (Factor 2)

	Mean	± SD	Baseline Mean	± SD	*t* value
Week 1	16.1	± 8.61	18.6	± 8.46	0.132
Week 2	16.7	± 8.67	18.6	± 8.46	0.279
Week 3	14.9	± 8.22	18.6	± 8.46	0.044*
Week 4	14.2	± 7.49	18.6	± 8.46	0.007**

*p value <0.05, **p value <0.01

nicotine became low dependent one week after the whole intervention, while two (7%) remained moderately dependent and two (7%) became high dependent. As seen in Table 5, these differences from baseline up to the fourth week were significant ($P < 0.05$, repeated measures ANOVA).

Discussion

Physiological dependence to nicotine may lead to smoking addiction as a result of withdrawal symptoms once the cigarette consumption has been stopped for few days. Craving or urge to smoke is one of the main reasons that deter successful cessation.[25] Several studies suggest that craving and relapse can easily induced by stress or other external factors that may cause the occurrence of negative affect such as irritability, anxiety, restlessness, insomnia and difficulty concentrating.[5,26] In this study, results showed that auricular acupressure treatment was effective in decreasing the level of cravings, cigarette consumption and level of nicotine dependence. Comparison of the results showed that auricular acupressure is more effective in decreasing craving caused by negative affect, although urge in general was significantly decreased from the start of the treatment until posttest.

The 5-point NADA protocol decreased the possible occurrences of the negative affect brought about by the sudden withdrawal from tobacco. Stimulation of different meridians corresponding to different *Zang organs* would bring back balance of *Qi* in the body causing a relief from negative affects such as anxiety, stress or tension. Apart from this, stimulation of the auricle through acupressure was reported to affect a certain part of the brain responsible for addiction through the release of neurotransmitters called serotonin. The release of serotonin suppresses the cravings to smoke, thereby decreasing the nicotine addiction and dependence.[27] Furthermore, the decrease in cravings to smoke causes the significant reduction of tobacco consumption immediately after a week of intervention.

One week after the 3-week intervention, 50% of the participants were classified to have only low nicotine dependency while 33% remained as high dependency. These findings validate the model presented above, that all participants with lower cravings to tobacco became less dependent on nicotine based on the decreased consumption of cigarettes.

The utilization of Traditional Chinese Medicine theories in this study served as guide and foundation for auricular acupressure as an intervention for smoking cessation. The Five Elements Theory provided the rationale of the five auricular points chosen by NADA. Stimulation of these five meridians through acupressure helps in balancing the Qi in the

Table 4. Average number of cigarettes consumed per day.

	Mean	± SD	Baseline Mean	± SD	*t* value
Week 1	12.3	± 5.74	18.1	± 5.02	0.000***
Week 2	12.1	± 6.20	18.1	± 5.02	0.000***
Week 3	11.8	± 6.66	18.1	± 5.02	0.000***
Week 4	10.6	± 6.20	18.1	± 5.02	0.000***

Table 5. Degree of nicotine dependence using FTND.

	Mean	± SD	Baseline Mean	± SD	*t* value
Week 1	4.7	± 2.20	6.0	± 1.10	0.001***
Week 2	4.9	± 1.94	6.0	± 1.10	0.001***
Week 3	4.7	± 2.14	6.0	± 1.10	0.001***
Week 4	4.6	± 2.19	6.0	± 1.10	0.000***

***p value <0.001; 2-tailed
***p value <0.001; 2-tailed

corresponding Zang Organs, which then facilitates the healing process of the body. Moreover, after bringing back the harmonious relationship of Qi in the body, withdrawal symptoms such as craving to smoke decreased significantly. In Western medicine perspective, the reported decrease in withdrawal symptoms provides a great impact in cessation since these negative emotional responses commonly predict relapse that may deter complete abstinence.

Participants also reported that cigarette became bitter, acrid or tasteless after the first week of treatment. Acupressure points in the ear seemed to affect the taste of the tobacco by some unknown mechanism. The bad taste decreased the subjects' desire to smoke, decreased cigarette consumption and reduced their dependency on nicotine. The decreasing level of dependency to nicotine may have led to smoking cessation. This change helps motivate smokers to reduce their smoking cravings and consumption that may lead to smoking abstinence. However, the author believes that it would be helpful to further explore the mechanism behind the cause of change in taste of tobacco.

Consequently, the results suggest that the 5-point NADA protocol is effective treatment in decreasing cravings by 1) reducing the occurrence of negative effects that may occur on sudden withdrawal from tobacco, and 2) suppressing a certain part of the brain responsible for nicotine addiction. Concurrently, the subjects' reported change in the taste of tobacco has positive correlation with cravings for smoking, cigarette consumption and nicotine dependence.

Therefore, auricular acupressure may be used as an adjunct in other smoking cessation programs. There were no reported side effects (such as skin irritation or allergy) from auricular acupressure during the course of the intervention. This finding shows that auricular acupressure could greatly assist individuals who want to quit smoking but in whom NRT is contraindicated.

For future studies, frequency of stimulation and amount of pressure of the ear pellets should be documented to increase the effect of auricular acupressure. Moreover, long-term effects of auricular acupressure on smoking cessation should be evaluated. The level of motivation and behavior of the participants towards smoking cessation should also be taken into account. The utilization of other materials, such as vaccaria seeds, with regards to smoking cessation can be further explored as they have been postulated to enhance the effect of acupressure. Further studies about the mechanism behind the cause of change in taste of tobacco would also be an advantageous.

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Improving motor performance of hemiparetic upper extremity among patients with chronic stroke using constraint-induced movement therapy

Archelle Jane C. Callejo, PTRP, MSPH

Abstract

Introduction The study aimed to determine the effectiveness of constraint-induced movement therapy compared to conventional therapy in improving the motor performance of a hemiparetic upper extremity among patients with chronic stroke.

Methods This was a single-blind randomized controlled trial conducted at the University of the East Ramon Magsaysay Memorial Medical Center, with pre-treatment and post-treatment assessment. Eligible participants were randomly assigned to either constraint-induced movement therapy or conventional therapy groups and underwent treatment for two weeks. The outcome measures included the Wolf Motor Function Test, which evaluated the speed in performing a functional task and the Functional Ability Scale, which assessed the quality of motion in performing a functional task.

Results Twelve participants were randomly assigned to either constraint-induced movement therapy or conventional therapy groups. Compared to the conventional therapy group, the constraint-induced movement therapy group had higher Wolf Motor Function Test and Functional Ability Scale scores after two weeks.

Conclusion Constraint-induced movement therapy may improve speed and quality of movement of the hemiparetic upper extremity among patients with chronic stroke.

Key words: Constraint-induced movement therapy (CIMT), stroke, upper extremity, stroke rehabilitation, hemiplegia

Studies on the physical therapy of stroke patients using various treatment approaches, usually compared to a conventional method, have been one of the most-documented areas in the field of medical research, with their evidences widely published. Findings from these studies have been incorporated in the routine part of post-stroke care[1, 2], which aims to maximize recovery by providing labor-intensive and patient-specific treatment. This may involve any of the following: restoring balance, re-educating mobility, and promoting functional movement.

Hemiparesis of the upper limb is a major contributor to the stroke-related disability and impaired activities of daily living. Only 20% of patients who remain flaccid two weeks after a stroke regain some functional use of their hand. Moreover, these patients have been encouraged to use their less affected upper extremity to perform tasks and progressively avoid the use of the affected upper extremity. This behavior results in a phenomenon termed as "learned non-use", which hinders a person's recovery of movement and function in the affected limb.[3]

The upper limb is of special concern because the impact of upper extremity impairments on disability is so marked.[4] Somehow, there has only been limited

attention given to upper extremity rehabilitation after stroke. Hence, functional recovery of the arm and hand has been generally limited when compared to that of the lower extremities.[1,4] Physical therapy interventions to improve the motor function of the upper limb among patients with chronic stroke involve various approaches. Some are impairment-based, such as electrical stimulation and EMG biofeedback, strengthening exercises with the use of free weights, theraband strips and/or manual resistance[5], while some are neuromuscular and physiologic-specific, such as proprioceptive neuromuscular facilitation, Bobath, Roods and Brunstrrom techniques.[6] However, the theories that underpin these approaches have shown no definitive conclusion regarding their effects in improving motor function among the stroke patients.[7]

Clinical evidence supports the potential effect of neuroplasticity among patients with stroke. A physical therapy intervention known as Motor Relearning Program, developed by Carr and Shepherd in 1987, is based on the concept that improvement in motor performance among patients with stroke should include interventions that are task- and context-specific[8], e.g., reaching for a cup. Cortical reorganization through neuroimagery techniques has found to be evident in most studies.[9,10] Constraint-induced movement therapy (CIMT), a type of a motor relearning program, is a method which forces the use of the affected side by restraining the unaffected side with a restraint such as a padded hand mitten, resting hand splint or arm sling while the patient is performing repetitive task-specific activities.[9,10] This intervention is based on the theory that it reverses the learned non-use behavior by "forcing" the affected upper extremity to perform functional tasks repetitively. Thus, CIMT was termed as forced-use therapy.[9, 10]

A meta-analysis of CIMT showed better outcomes when applied in both acute and chronic, or even sub-acute stages.[4] Various studies, including case studies, case series, systematic reviews, and multi-site randomized controlled trials have shown the effectiveness of CIMT. Moreover, CIMT is now being cited in various references and books for stroke rehabilitation as a treatment to improve the motor function of a hemiparetic upper extremity.

CIMT is rarely used by PT professionals in the country because they rely mostly on the treatment strategies learned during their undergraduate studies, instead of using those that have been found effective based on recent evidence-based studies.[11] To address this predicament, this study aimed to systematically look into the effectiveness of CIMT, compared to conventional treatment employed by PT professionals, in improving the motor performance of the hemiparetic upper extremity in patients with chronic stroke. The study also aimed to provide reliable information and valuable knowledge to Filipino physical therapists about a treatment strategy that can be adopted as part of their rehabilitation programs for the hemiparetic upper extremity of stroke patients.

Methods

This was a randomized controlled trial comparing the effectiveness of CIMT with conventional physical therapy (CPT) in improving the motor performance of the hemiparetic extremity of patients with chronic stroke conducted at the University of the East Ramon Magsaysay Memorial Medical Center. The participants were recruited from the UERM Memorial Hospital Department of Rehabilitation Medicine, Department of Neurology, Out-Patient Department and from the health center of Barangay Doña Imelda from December 2008 to February 2009.

Eligible participants were those who met the following criteria: 1) demonstrated active wrist extension of at least 20° and 10° active extension of the metacarpophalangeal joints and each interphalangeal joint of all digits; 2) demonstrated at least one of the following: adequate balance while wearing the restraint and transferring to and from the toilet independently, ability to stand from a sitting position or ability to stand for at least 2 minutes with or without upper extremity support; 3) passive range of motion of shoulder flexion and abduction of 90°, shoulder external rotation of 45°, at least 30° of elbow extension, 45° of forearm supination from neutral, 45° of forearm pronation from neutral; 4) Mini Mental State Examination score of at least 19 to avoid the confounding effects of cognitive problems; 5) good general health and fit to participate in the study as confirmed by the participant's physiatrist; 6) stroke onset of > 1 year but not more than five years; 7) ability to put on the arm restraint independently and 8) male or female aged 40-80 years.

Participants were excluded if they had: 1) more than one stroke incident; 2) severe/excessive pain in any joint on the affected extremity that could limit

and/or restrict its movements; 3) severe spasticity and contractures/tightness of the affected upper extremity; 4) aphasia or any communication deficit; 5) severe visual field defect (homonymous hemianopsia) assessed using visual confrontation test; 6) severe medical or orthopedic complications; 7) any medications that would inhibit patient from active participation and 8) any severe co-morbidities like subarachnoid bleeding, tumors of the brain, and any medical conditions such as peripheral or central vestibular pathology, blindness, Parkinson's disease, osteoarthritis.

An informed consent that included permission for the investigator to record on video their respective performances was secured from eligible patients. A sample size of five participants each for the CIMT and control groups was computed-based on the following parameters: 80% power, 95% confidence level and 40% effect size (time difference between CIMT and control group). Subjects were randomly assigned to either CIMT or CPT groups. The outcome measures employed were each participant's 1) speed in performing the task measured in seconds using Wolf Motor Function Test (WMFT); 2) ability to perform the task as measured by a 6-point ordinal Functional Ability Scale (FAS).

The investigator trained the designated licensed physical therapist on CIMT and the use of the WMFT and FAS. She also provided written guidelines on CIMT implementation and video of the CIMT tasks. The physical therapist was also required to perform a return demonstration of the CIMT.

The participants were asked to participate in 10 consecutive sessions on week days. During the daily therapy sessions, the blood pressure and pulse rate of the participants in both groups were monitored and documented before, during and after the intervention. Video recordings of the participants' performance were taken at baseline and after the two-week intervention. Participants assigned to the CIMT group were asked to wear the restraint (over-the-counter arm sling) on the non-affected upper extremity for 6 hours while performing the tasks. A video of the tasks was shown to the participants to help them clearly understand the instructions; the clinician provided them additional visual, tactile and auditory cues.

The CIMT intervention was composed of 16 functional tasks related to reaching, grasping and manipulating activities of the hand done in two positions with the participant seated in front of a table and parallel to the table. Each task progressed to the next once the participant achieved at least a grade of 4 using the FAS or WMFT, i.e., when the movement was close to normal, but slightly slower, lacked precision, fine coordination or fluidity. The intervention phase was as follows:

Sitting parallel to side of table

Tasks under this phase were the preliminary activities of the CIMT intervention intended to improve the reaching, releasing, and grasping performance of the hemiparetic extremity. The activities included tapping tasks, done by asking the participant to touch each finger tip and thumb of the hemiparetic hand together as rapidly as possible. The clinician gave the progression of the tapping sequence (e.g. index finger to thumb etc.); opening and closing of the hemiparetic hand while forearm was maintained in neutral or mid pronation-supination position; grasping a cup repetitively, making sure that the position of the cup was altered; grasping and lifting a cup from table upwards and sidewards, while fixing the mid-positioned forearm at the table; grasping and sliding a cup across the table to different markers without lifting the forearm from the table, and grasping and lifting the cup from the participant's lap to the table. These activities were sequenced according to increasing difficulty and were performed during the first week.

Sitting in front of table

Tasks under this phase focused on improving object manipulation and dexterity performance. These included lifting a pencil from the table using the thumb, index and middle finger while maintaining the horizontal position of the pencil; transferring marbles from one cup to another with a scooping motion and using all fingers as much as possible, followed by picking one marble from one cup to another using pincer grasp; flipping three cards back and forth while observing precise movement of the thumb and other three fingers; folding the towel into two parts, lengthwise to crosswise; turning a knob and combing hair.

Participants assigned to the conventional therapy group were asked to attend physical therapy sessions for 10 consecutive weekdays, for 1 to 2 hours per day. They were also asked to continue the usual care

they were receiving for the treatment of their hemiparetic upper extremity. Participants who did not receive any formal physical therapy prior to enrolment in the study were evaluated by a physiatrist and given appropriate PT interventions. Their treatment included range of motion exercises, stretching maneuvers, strengthening and neurodevelopmental techniques, such as Bobath or Brunstrrom, Roods and proprioceptive neuromuscular facilitation (PNF) approach for improving motor function of the affected upper extremity.

Participants in both groups were re-evaluated by a blinded assessor immediately after the two-week program. The data collected from all the participants were encoded into a computerized data base using Microsoft Excel 2007 and analyzed using SPSS version 14. Baseline characteristics of groups were determined for comparison. Measures of central tendency (mean) and standard deviations were calculated to compare the difference in both groups' performance on WMFT and FAS scores at baseline and after two weeks. An independent T-test and a Mann-Whitney U Test were used to determine the association of the difference in the performance between the two groups for interval and nominal data, respectively.[12]

Results

Thirty participants recruited but 18 were excluded because they did not meet the inclusion criteria or refused to participate in the study. Twelve participants were randomly assigned to either CIMT or conventional therapy: six to the CIMT group and the other six in the conventional group. The characteristics of the participants in the two groups are shown in Table 1. The CIMT group was significantly older and had an earlier onset of stroke compared with the conventional therapy group. One participant in the conventional therapy group dropped out.

Table 2 shows no significant differences in the baseline WMFT mean scores of the CIMT and conventional groups. Table 3 shows that the CIMT group had faster times than the conventional group after 10 days of treatment although the differences were not significant. WMFT which assessed joint segment movements (WMFT 1-7) showed faster time performance as compared with WMFT that assessed integrative functional movements (WMFT 8-15). Table 4 shows no significant difference in the baseline FAS scores of the CIMT and conventional treatment groups. Table 5 shows that after 10 days of treatment, the FAS scores were significantly higher for the CIMT group in W1 and W2 but not in the other tasks.

Discussion

Previous randomized trials and systematic reviews on CIMT have shown significant improvement in the motor performance of the affected upper extremity among patients with chronic stroke. This study showed improvements in the speed and quality of

Table 1. Baseline characteristics of the CIMT and conventional groups.

Variable	CIMT (n = 6)	Conventional (n = 6)	P value
Age (years)	61.5 +/- 7.39	48.67 +/- 9.02	0.02
Gender			
Male	4 (66.6%)	5 (83.33)	0.05
Female	2 (33.3%)	1 (16.67)	
MMSE	27.66 +/- 1.75 (25-30)	27.17 +/- 1.47 (25-29)	0.60
Onset of stroke (years)	5.43 +/- 1.72	1.5 +/- 0.55	0.03
Hemiparetic upper extremity			
Right	5 (83.3%)	3 (50%)	0.20
Left	1 (16.67%)	3 (50%)	

NOTE: Values are frequency (%) or mean + standard deviation (SD)
*P value using chi-square for nominal data and independent t-test for continuous variables

motor performance among the CIMT group, based on the mean WMFT and FAS scores, after the two-week intervention.

These findings clearly suggest that task-specific, highly intensive training of the affected upper extremity among the subjects who actively participated, coupled with appropriate feedback from the clinician, resulted in substantial improvement in the motor function of the affected upper extremity than those interventions that were performed with minimal repetitions and without the participant's active participation.[13] Underlying this improvement in motor performance is concept of motor re-learning: individuals tend to have a better response to therapy when properly rewarded and motivated (Thorndike's law of effect) and when provided with appropriate feedback concerning the extent to which the response accomplished the movement goal (Knowledge of

Table 2. Baseline WMFT (sec) of CIMT and conventional group.

WMFT Tasks	CIMT Mean and Std Dev	Conventional Mean and Std Dev	P value
W1	5.83 ± 1.47	9.00 ± 7.01	0.33
W2	6.16 ± 1.17	10.67 ± 6.5	0.15
W5	6.33 ± 2.16	6.83 ± 2.4	0.71
W6	6.00 ± 0.63	8.50 ± 2.51	0.31
W3	8.33 ± 4.63	6.50 ± 2.34	0.41
W4	7.67 ± 1.96	8.83 ± 4.79	0.59
W7	8.00 ± 5.09	13.67 ± 11.36	0.29
W8	48.83 ± 55.19	30.83 ± 44.42	0.93
W9	36.16 ± 42.99	29.50 ± 45.54	0.79
W10	70.5 ± 46.70	35.50 ± 41.71	0.52
W11	74.66 ± 51.02	35.17 ± 41.59	0.46
W12	93.00 ± 41.85	39.00 ± 40.42	0.19
W13	51.16 ± 55.34	33.17 ± 43.23	0.99
W14	76.50 ± 49.16	41.67 ± 41.40	0.54
W15	19.50 ± 21.79	19.33 ± 18.28	0.51

Table 3. Post 2-week WMFT (sec) of CIMT and conventional group.

WMFT Tasks	CIMT Mean and Std Dev	Conventional Mean and Std Dev	P value
W1	4.33 ± 1.21	5.83 ± 1.60	0.09
W2	4.83 ± 1.17	6.17 ± 1.47	0.11
W5	5.16 ± 0.75	5.00 ± 1.33	0.99
W6	5.67 ± 0.82	6.00 ± 46.47	0.35
W3	8.00 ± 3.95	7.17 ± 3.35	0.65
W4	6.33 ± 2.25	26.5 ± 3.39	0.56
W7	7.00 ± 5.62	48.6 ± 56.14	0.12
W8	49.17 ± 54.60	64.5 ± 60.81	0.65
W9	52.83 ± 53.51	63.00 ± 62.45	0.76
W10	62.17 ± 45.55	67.83 ± 57.20	0.85
W11	61.17 ± 47.36	70.00 ± 54.47	0.76
W12	75.33 ± 49.79	70.00 ± 54.86	0.86*
W13	21.67 ± 20.34	49.50 ± 55.26	0.28
W14	64.83 ± 47.70	69.83 ± 55.07	0.87
W15	17.83 ± 19.81	29.83 ± 44.93	0.56

Note:
*WMFT (Wolf Motor Function Test - measured in seconds. WMFT tasks are arranged according to its classification. Values are mean ± SD; P value using independent t-test

Results - KR), and the response about the performance and execution of movement or knowledge of performance – KP.[14,15,16] These physiological bases of motor learning are essential for overcoming deficits in velocity production (speed) and movement execution or quality of movement.[7]

Although substantial improvements were noted in terms of both speed and quality of motion among participants in the CIMT group, improvement in the quality of motion was less. The findings suggest that participants from the CIMT group had only attained the acquisition phase of motor learning which better explained the improvements of speed in performing tasks, more than the quality of motion. In addition, baseline and post two-week WMFT and FAS mean scores between groups that assessed joint-segment movements or WMFT tasks 1-7 obtained lesser mean scores than WMFT tasks that assessed integrative

Table 4. Baseline FAS scores of CIMT and conventional group.

WMFT Tasks	CIMT Mean and Std Dev	Conventional Mean and Std Dev	P value
W1	3.33 ± 0.52	3.00 ± 1.09	0.72
W2	3.33 ± 0.52	2.50 ± 1.22	0.31
W5	3.33 ± 0.82	3.16 ± 0.41	0.93
W6	3.33 ± 0.82	2.67 ± 1.03	0.39
W3	3.17 ± 0.41	2.33 ± 1.21	0.24
W4	3.00 ± 1.09	2.33 ± 1.50	0.58
W7	3.17 ± 0.75	2.33 ± 1.21	0.24
W8	2.67 ± 1.21	2.33 ± 1.21	0.69
W9	2.50 ± 1.38	2.17 ± 1.33	0.69
W10	2.17 ± 1.47	2.17 ± 1.33	0.93
W11	1.83 ± 1.32	2.17 ± 1.33	0.69
W12	2.33 ± 1.21	2.17 ± 1.33	0.82
W13	1.83 ± 1.32	2.33 ± 1.51	0.58
W14	2.50 ± 1.51	2.17 ± 1.33	0.82
W15	3.00 ± 1.09	2.17 ± 1.33	0.31

Table 5. Post-2 week FAS scores of CIMT and conventional group.

WMFT Tasks	CIMT Mean and Std Dev	Conventional Mean and Std Dev	P value
W1	4.17 ± 0.75	3.33 ± 0.58	0.05
W2	4.17 ± 0.75	2.83 ± 0.82	0.02
W5	3.83 ± 0.51	3.50 ± 0.58	0.24
W6	3.67 ± 0.52	2.83 ± 0.82	0.16
W3	4.00 ± 0.89	2.67 ± 1.41	0.09
W4	3.67 ± 0.51	2.83 ± 1.41	0.28
W7	3.33 ± 0.82	2.33 ± 1.50	0.24
W8	3.00 ± 0.89	2.17 ± 1.15	0.25
W9	2.83 ± 1.17	2.33 ± 1.50	0.56
W10	2.33 ± 1.51	2.17 ± 1.50	0.79
W11	2.33 ± 1.51	2.00 ± 1.15	0.60
W12	2.50 ± 1.38	2.17 ± 1.50	0.61
W13	2.33 ± 1.51	2.17 ± 1.50	0.79
W14	2.67 ± 1.63	2.17 ± 1.50	0.56
W15	3.67 ± 1.21	2.17 ± 1.29	0.17

Note±:
FAS - Functional Ability Scale measured by a 6-point ordinal scale. Tasks are arranged according to its classification. Values are mean ± SD; P value using Mann-Whitney U Test.

functional movement (WMFT 8-15) based on the mean scores between groups.

This observation may be supported by the concept that movements involving the larger joints (shoulder and elbow) have simple cortical representations which make learning easier than movements involving the small joints. Tasks, such as flipping a card (WMFT 12), lifting paper clips using pincer grasp (WMFT 10) and activities of the hands were complex skills that needed activation of a complex cortical circuitry, thus requiring more intensive training, while taking note of the specific detail of the movement.[16, 17]

The effects of CIMT may have been limited since restraint of the unaffected arm was confined to the six-hour training only, compared with other CIMT studies that restrained the unaffected arm for as long as 90% of the patients' waking hours. More improvement in motor function may have been gained if the CIMT was extended beyond two weeks even if 90% restraint of the unaffected arm was not done.[18,19,20]

Convenience sampling may have resulted in the CIMT group being generally older and having an earlier onset of stroke than the conventional therapy group. This had no effect on the baseline mean WMFT and FAS scores; this may be counter-evidence to the traditional view that most patients reach a plateau in their motor recovery at 6 months to one year after a stroke, beyond which there could be little or no further improvement. Thus, issues of potential spontaneous recovery of participants during the conduct of the study would rule out the possibility of posing potential effect on the gathered results. Even the two participants with the longest post stroke time (4 and 5 years) in the CIMT group showed apparent improvement at the conclusion of the study. Findings would be clearly consistent with previous studies that even patients with a very chronic onset of stroke would be amenable to CIMT.[9,18,21]

Time and financial constraints resulted in certain limitations: 1) difficulty in obtaining a large, homogenous sample; 2) long-term benefits and/or retention effect was not evaluated; 3) difference between frequencies of treatment sessions given to the patients prescribed by their attending physiatrist/s; 4) limited time of restraint of the unaffected arm; and 5) use of the paretic upper extremity and improvements of quality of life were not assessed.

Despite its limitations, this study has provided evidence that CIMT can improve the motor performance, in terms of speed and, to a lesser extent, quality, of movement of hemiparetic upper extremity among patients with chronic stroke. However, future studies need to be conducted with a larger sample with homogenous participants and equal frequency of treatment approach. This would help offer further proof of the effectiveness of CIMT.

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A randomized controlled trial of virgin coconut oil and ultrasound gel as coupling medium for therapeutic ultrasound in the management of pain from degenerative osteoarthritis

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Abstract

Introduction This study aimed to compare the effectiveness of direct ultrasound treatment coupled with virgin coconut oil to ultrasound treatment coupled with standard ultrasound gel in the management of pain in degenerative osteoarthritis of the knee.

Methods Twenty-four patients were randomly assigned to either virgin coconut oil or gel groups. Continuous ultrasound of 1.0 MHz frequency and 1.5 watts/cm^2 was applied for seven minutes to the painful knee joint for 12 treatment sessions using either virgin coconut oil or gel as coupling medium. The outcome measures were pain level assessed by a visual analogue scale and onset of pain relief from the baseline to four weeks post-treatment. Significant pain relief was defined as a 20% decrease from the baseline pain score. The onset of pain relief was recorded as three consecutive days of decrease from the baseline score.

Results Both groups had a mean pain score of 7.5. After two weeks, there was a lower mean score (2.6) for the virgin coconut oil group compared with the gel group (2.9). After four weeks, there was a lower mean score for the gel group (2.1) compared with the virgin coconut oil group (2.5). An earlier onset of pain relief was noted for the virgin coconut oil group (15.9 ± 10.1 days) compared with the gel group (18.3 ± 8.3 days). The differences in the mean pain scores and onset of pain relief between the two groups were not significant.

Conclusion Virgin coconut oil is as effective as standard gel when used as coupling media in therapeutic ultrasound in pain management for degenerative osteoarthritis of the knee. Virgin coconut oil may be an alternative coupling medium for therapeutic ultrasound that is locally available and relatively inexpensive.

Key words: virgin coconut oil, therapeutic ultrasound gel, coupling medium

About 11 million Filipinos suffer from degenerative osteoarthritis based on a prevalence rate of 16%.[1] Based on this trend, it would not be surprising if two-thirds of the patients seen in physical medicine and rehabilitation clinics would complain of pain from degenerative osteoarthritis. The most commonly prescribed physical therapy modality in pain management of degenerative osteoarthritis (DOA) is therapeutic ultrasound.[2] It uses high frequency acoustic energy to produce both thermal and non-thermal effects. Sound waves that pass through the skin cause vibration of local tissue producing an increase in tissue temperature, increase tissue extensibility and alteration in cell membrane permeability.[3] Ultrasound waves cannot travel through air. They require a coupling medium applied between the skin and the ultrasound head to reduce friction and allow the acoustic energy to enter the

target tissue. The preferred coupling medium, a water-soluble gel, effectively allows ultrasound transmission between the head and the skin but generally fails to produce an independent palliative or therapeutic effect.[4] This is the reason phonophoresis became popular in recent years. Phonophoresis is the migration of drug molecules contained in a coupling agent through the skin under the influence of ultrasound. Increased cell permeability caused by ultrasound facilitates the absorption of some drugs like steroids or non-steroidal anti-inflammatory ointments.[4]

In recent years, there has been tremendous interest generated by the health benefits of virgin coconut oil (VCO). A study by Sadeghi[5] found that coconut oil reduces proinflammatory chemicals in the body and suggests that it might be useful in therapies for a number of acute and chronic inflammatory conditions. Coconut oil may be helpful in slowing down the degenerative process by improving mineral absorption, protecting the bones from free radicals and maintaining hormone balance.[6] VCO is also readily available locally and affordable.[7] There are also anecdotal reports of VCO used to stimulate healing and repair of aching joints and muscles when massaged directly over the area. It is believed to stimulate healing and repair because of the metabolic effect that medium chain fatty acids have on cells. Cellular activity, including healing of injuries, is regulated by the body's metabolism. When the metabolic rate is high, cellular activity is accelerated and processes such as tissue healing and replacing damaged or diseased cells with healthy new ones, are all performed at a heightened rate of activity.[6] Recently, there has been much concern regarding the reported anti-oxidant, anti-inflammatory and analgesic effect of topical application of VCO for some conditions like systemic lupus erythematosis, scleroderma, fibromyalgia and arthritis.[7] However, all these therapeutic and health-giving advantages of VCO remain anecdotal and unproven scientifically. So far, there has only been one local study done to document the effectiveness of VCO as a coupling medium for ultrasound. This was used only for acute musculotendinous injuries. Comparison was made between VCO and mineral oil as a coupling media for therapeutic ultrasound. However, all results were not significant.[8]

Data comparing the decrease in pain with ultrasound coupled with VCO and ultrasound coupled with standard ultrasound gel are lacking. It would be timely to document scientifically the possibility of producing more significant pain relief with the use of VCO as a coupling medium. Given its anti-inflammatory properties, there might be lesser need to expose the patients to pain medications and thus prevent potential gastrointestinal, cardiovascular and renal complications. With VCO's properties of pleasing scent, sediment free, low viscosity and resistance to rancidity, it may make an excellent coupling medium and probably provide added benefits from its analgesic and anti-inflammatory properties. Thus, a possible alternative coupling medium for ultrasound might be virgin coconut oil. This study aimed to compare the effectiveness of ultrasound treatment coupled with virgin coconut oil or standard gel in pain management for degenerative osteoarthritis of the knee. Specifically, the study aimed to determine the degree of pain relief and the onset of pain relief.

Methods

This was a randomized clinical trial with independent concurrent controls. The sequence of the conduct of the study resembled the actual procedures in the clinical setting, which was important for the relevance of the results.

Patients referred for physical therapy, 50 years old and above with degenerative osteoarthritis of the knee were screened for the study. Eligible subjects were those who met the following criteria: 1) knee pain secondary to degenerative osteoarthritis with findings of osteophytes on radiographic examination, 2) duration of knee pain of at least 3 months, and 3) visual analogue scale pain score of at least 5/10. Subjects were excluded if 1) there were contraindications to use of therapeutic ultrasound and 2) there were known contraindications to intake of non-steroidal anti-inflammatory drugs. Those who satisfied the inclusion criteria were asked to sign an informed consent and assigned by simple randomization to either treatment group A (virgin coconut oil) or treatment group B (ultrasound gel).

The primary outcome was pain relief defined as a 20% decrease from the baseline pain score. The secondary outcome was the onset of pain relief defined as the number of days from the baseline to achieve a 20% decrease in pain score for three consecutive days from the baseline pain score. Pain scores were measured with a visual analogue scale

(VAS). Baseline measurements were taken prior to randomization.

Subjects were given a weekly pain diary with specific instructions to record the pain level, intake of medications and activity level every day for 4 weeks. A different VAS card was used for each subject, during baseline and subsequent follow-up visits. VAS scores and onset of pain relief (in days) were recorded on separate data collection form. The physical therapist recorded the pain level for both groups prior to the ultrasound treatment and after the 2nd and 4th week of the treatment. The PT evaluator was unaware of the treatment protocol and previous VAS scores given by the subjects. Both the PT evaluator and subjects were advised to avoid discussions regarding the treatment protocol. The subjects' diaries were followed up every treatment to assure their completion every day and were collected from the subjects weekly. The number of days from baseline evaluation to the 20% drop in VAS scores was recorded.

The actual treatment sessions were done by a different licensed physical therapist who underwent training for the actual procedures for the study. Each subject in both treatment groups was prescribed ultrasound coupled with either VCO or ultrasound gel using an Enraf Nonius Sonopuls 190™ with a large transducer head set to the following parameters: a) frequency: 1.0 megahertz, b) mode: continuous, c) intensity: 1.5 watts per square centimeter and d) treatment time: 7 minutes. Both the VCO and ultrasound gel were placed in identical containers to avoid direct identification of the specific coupling medium by the subjects. The same brands of VCO and ultrasound gel were used for the entire duration of the study.

The patient was positioned supine while the PT poured 5.0 ml of VCO or ultrasound gel over the subject's knee joint. The PT set the prescribed parameters on the ultrasound machine. Firm pressure was maintained on the knee joint while moving the ultrasound head in a circular motion at 2 – 3 seconds per revolution. The subjects were taught and instructed to do 10 repetitions of active range of motion exercises for the painful knee.

The same instructions were given to all subjects in each treatment group. All subjects were given mefenamic acid (Pharex™) 250 mg three times a day for the first 5 days. Activities such as jogging, squatting and any form of manipulation of the knee were discouraged. Subjects who were unable to attend the thrice-weekly therapy for four weeks were dropped from the study. Follow-ups were done for the dropouts to find out the reasons for dropping and intention to treat analysis was done for non-compliant subjects.

Results

The baseline characteristics of 24 patients are shown in Tables 1 and 2. The mean age of the subjects was 59.7 years. Majority of the patients were women. There were no significant differences between the subjects with respect to age, gender and onset of knee pain for both treatment groups. After the first week of the study, two subjects in treatment group A failed to follow-up. They apparently experienced very minimal pain on the treated knee with VAS scores 0 and 1, respectively.

Table 2. Onset of knee pain.

	Mean (months)	Standard Deviation	P
VCO	64.1	54.3	0.36
Gel	76.6	108.4	
Total	70.3	85.9	

VCO, virgin coconut oil
Statistically significant if P <0.05

Table 1. Baseline patient demographics.

Variables	Age			Sex		
	Mean (years)	SD	p N%	Male N%	Female	P
VCO	60.7	5.0	0.95	5 (42%)	7 (58%)	0.75
Gel	58.7	5.1		3 (25%)	9 (75%)	
Total	59.7	5.1		8 (33%)	16 (67%)	

VCO, virgin coconut oil
Statistically significant if p<0.05

The mean pain level decreased for both treatment groups from baseline to two weeks and two weeks to four weeks after the treatment. The mean difference and standard deviation of VAS scores for both VCO and ultrasound gel are presented in Table 3. Both groups had the same mean baseline VAS score. After two weeks, a slightly lower mean VAS score was noted in the VCO group. The findings showed improvement in the mean VAS score by 64% and 63% for the VCO and gel groups, respectively. However after four weeks, there was a lower mean VAS score for the gel group. At four weeks, 42% of VCO patients reported no pain on the treated knee compared with 75% in the gel group. An independent t-test revealed no significant difference in the VAS scores between the two groups at 2 and 4 weeks post treatment.

Table 4 shows the mean onset of pain relief in ultrasound with VCO and gel. There was note of earlier onset of pain relief for the VCO group (15.9 days) compared to the gel group (18.3 days). The difference was not significant.

On review of patient diaries, at baseline 58% of the VCO group engaged on walking, jogging and squatting activities compared to only 33% in the gel group. More patients in the VCO group continued to do these activities which are considered to have a direct impact on the knees despite complaints of pain. Majority of the patients did not take any pain medications during the entire duration of the study. Only two patients in both the VCO and gel groups took pain medications during the four weeks of treatment.

Discussion

There was no significant difference in the VAS scores and onset of pain relief between the VCO and gel group. Virgin coconut oil was similar to the standard gel as a coupling medium for therapeutic ultrasound in pain relief. The degree of improvement was similar in the two groups and VCO did not provide any additional benefit to the standard gel.

Researchers have studied the relative transmission characteristics of different gel coupling media.[9] In 2007, Poltawski[10] studied the transmission characteristics of a variety of coupling agents including KY Gel™, EMS™, Aquasonic™, JPM™, PhysioMed™, SKF™ and Biofreeze™. The relative transmission qualities of gels were compared to degassed water, but the differences were not significant.

Table 3. Mean VAS scores of VCO and ultrasound gel group.

Treatment Group	Sample Size	Mean VAS1	SD1	p	Mean VAS2	SD2	p	Mean VAS3	SD3	p
VCO	12	7.5	1.8	0.5	2.7	2.6	0.47	1.9	2.5	0.18
Gel	12	7.5	1.9		2.8	2.9		1.0	2.1	

VAS, visual analogue scale; a lower value means less pain
VAS1, baseline VAS score; VAS2, VAS after 2 weeks; VAS3, VAS after 4 weeks
SD1, baseline standard deviation; SD2, standard deviation after 2 weeks;
SD3, standard deviation after 4 weeks
Statistically significant if $P < 0.05$

Table 4. Mean onset of pain relief in ultrasound with VCO and gel.

Treatment Group	Sample Size	Range (days)	Mean (days)	Standard Deviation	P
VCO	12	6 - 28	15.9	10.1	0.63
Gel	12	6 - 28	18.3	8.3	

Statistically significant if $P < 0.05$ (comparing both groups)

In phonophoresis, which uses ultrasound combined with specific medications to encourage transdermal penetration of the compound, the subcutaneous circulation picks up significant amounts of a drug. Claims of penetration to depths of several centimeters have been made. Approximately 75% of the studies reviewed indicate some level of effectiveness of ultrasound as an enhancer of topically applied drugs.[11]

Studies as early as 1999 suggest that coconut oil may reduce inflammation in arthritis and help slow down the degenerative process by protecting the bones from free radicals.[6] The process of inflammation in DOA involves the release of proinflammatory cytokines. Fatty acids have been proposed to reduce chronic inflammation in arthritis.[12]

This study was designed to assess the effectiveness of virgin coconut oil as an alternative coupling medium whose effects were based on the patient's perception of pain experienced rather than actual changes in tissue temperature or relative transmission. The primary concern was to document the decrease in the amount of perceived pain, using a validated instrument (VAS), and earlier onset of pain relief with the use of a specific coupling medium. The investigator proposed that the improvements in the outcome measures of pain relief would be better with the VCO than the standard gel resulting from additional benefits inherent to the VCO. However, neither coupling media was found to be superior to the other. Pain relief was noted in both study arms, with a slightly earlier onset of pain relief noted in the VCO group. The degree of improvement was similar in the two groups and VCO did not provide any additional benefit to that of the standard gel. The walking, jogging and squatting activities of the patients were seen more for the VCO group. This meant that despite the presence of knee pain, they continued to engage in activities that were strenuous to the knee joint. The intake of medications was actually the same for both groups, so this could not have affected the results. A 2007 study[8] on the effectiveness of VCO against mineral oil as a coupling medium for therapeutic ultrasound found no significant difference in the treatment of 43 patients with subacute musculotendinous pain. This is compatible with the result of the current study.

This study showed that VCO may be used as an alternative coupling medium between the transducer head and the skin. This was evident in the VAS scores which continually decreased from baseline to four weeks after the treatment. A perceived advantage of VCO was its medium chain fatty acid composition. However, the fatty acid in VCO has to be able to penetrate not only the skin but also the joint space to exert its local effect.

It was possible that the depth of penetration of VCO would have reached only up to the subcutaneous areas, with limited penetration to the joint space. The skin is an excellent barrier for drug transport but certain physical methods such as phonophoresis can enhance permeation of drugs through the skin.[13] In phonophoresis, the ultrasound waves propagate in the skin and cause effects which increase skin penetration of various drugs, via enhanced diffusion or enhanced convection.[14] Ultrasound waves of various frequencies has been used to increase skin permeability. A phenomenon called acoustic cavitation is presumed as the main mechanism of the enhancing effect of ultrasound. This happens when gas bubbles form and subsequently collapse, which leads to the formation of holes in the corneocytes, an enlargement of intercellular space and the perturbation of the stratum corneum lipids. An additional mechanism is the temperature increase, which increases the fluidity of the stratum corneum lipids.[15]

Based on the review of literature, most of the studies concentrated on drugs like ketoprofen and diclofenac for phonophoresis. Non-steroidal anti-inflammatory drugs (NSAIDs) administered topically penetrate slowly, and in small quantities, into the systemic circulation. Numerous studies have been done to shed light on transdermal drug delivery for dermatologic conditions, using specific active components of drugs. Among five fatty acids investigated, 10% caprylic acid in propylene glycol had the highest enhancing effect in the transdermal delivery of the non-steroidal anti-inflammatory agent ketorolac tromethamine.[16]

A study on synergistic effects of chemical enhancers like fatty acids (linoleic acid) and ultrasound suggest that they are able to transform the stratum corneum lipid bilayers into a fluid lipid bilayer phase allowing significant amount of drugs to penetrate the skin.[17] This may explain the slightly earlier onset of pain relief in the VCO group. The presence of the VCO as a coupling medium could have facilitated greater acoustic penetration of the ultrasound. It may also be possible that the use of

VCO as a coupling medium may be helpful only in so far as enhancing absorption of active drug components, and not a direct absorption or effect of its fatty acids. In the study by Johnson, there is enhanced absorption of corticosteroid with the use of linoleic acid together with ultrasound.

It is possible that fatty acids from VCO have gained access to the synovial fluid but since penetration of topically applied medications is slow and in minute quantities, no significant difference was noted in the onset of pain relief. Concentrations of NSAIDs in the muscle tissue below the site of application are variable, depending on the product formulation. When applied topically, NSAIDs do not reach the synovial fluid but the extent and mechanism remain to be determined.[19]

Finally, although the hypothesized additional benefits from using VCO were not demonstrated in this study, the study did show that there is a locally available alternative to standard ultrasound gel. Furthermore, materials used for clinical practice often depend on other factors like availability of resources and practicality for clinical setting. VCO is readily available, relatively inexpensive and demonstrably effective as an alternative medium for ultrasound. The economic aspects of this merit further study in the future. VCO as an ultrasound coupling medium may be one more market for the local coconut industry.

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Correlation of internship grades and physical therapy and occupational therapy licensure examination passing rate among physical therapy graduates of a private college in Metro Manila

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Abstract

Background The study is a retrospective correlation between final internship grades and the Physical Therapy and Occupational Therapy Licensure Examination results of BS Physical Therapy graduates. The study aimed to determine the probability of physical therapy graduates passing the board examination based on their performance in internship.

Methods Seventy two physical therapy graduates from a college in Metro Manila covering three batches from 2010 to 2012 were included. The final internship grades and the Physical Therapy and Occupational Therapy Licensure Examination results were correlated by the use of the Pearson Product Moment Correlation. Odds ratio was used to provide additional information about the passing rates of the examinees.

Results Only 2% of graduates who passed their internship failed in the board examination while 32% of those who failed their internship failed their first attempt in the board examination. This led to a moderate positive correlation of 0.530 (P = 0.001). In addition, odds ratio predicted that students who passed their internship were nearly 23 times more likely to pass the board examination.

Conclusion The study showed that there was positive correlation between final internship grades and Physical Therapy and Occupational Therapy Licensure Examination results. Based on the findings, a physical therapy graduate obtaining a passing grade in the internship academics may predict a positive performance the board examination.

Key words: Internship grade, Physical Therapy and Occupational Therapy licensure examination

Physical Therapy (PT) is a rapidly growing profession wherein various modalities and exercise, coupled with a specialized knowledge on the human body, are used to prevent impairment and disability, restore function, mobility and independence and/or improve physical attributes. The growing population locally and worldwide has resulted in a steady growth in the demand for competent physical therapists leading to an increase in the number of enrollees in this course.[2]

In the Philippines, the practice of physical therapy is regulated by the Professional Regulation Commission through a bi-annual licensure or board examination. Only those who pass the Physical Therapy and Occupational Therapy Licensure Examination are allowed to practice the profession.[3] As the gateway to the physical therapy profession, the examination has achieved a secondary purpose: to serve as the benchmark for a physical therapy program's effectiveness in training future professionals. A top performing school is measured by the proportion of successful examinees it produces.

One of the prerequisites to taking the board examination is a diploma in Bachelor of Science

Physical Therapy, the final requirement of which is the completion of a 10 month Clinical Internship program. This ensures that graduates of a physical therapy course receive the necessary patient exposure and skills through a one year rotation in different settings coupled with the experience of handling and treating a myriad of conditions and patients from all walks of life. As such, clinical internship can be seen as the culmination of four years of accumulated theoretical knowledge and practical skills, testing one's abilities and capabilities in a real world setting.

One of the top performing colleges of physical therapy in Metro Manila is part of a prestigious medical university. It has enjoyed a lofty position among the top performing schools since its inception in the late 1980s, having had high passing rates and several topnotchers in the board examination over the years. Following a Commission on Higher Education (CHED) mandated curriculum, its Level V year is a Clinical Internship, coupled with comprehensive theoretical examinations, oral revalidas and objective structured clinical examinations, or OSCE, spread out over three grading periods. In addition, the College utilizes a tried and tested problem-based learning, or PBL, to encourage self-directed learning and to improve competency in handling clinic situations.[8]

The researchers wanted to determine whether the internship grades of graduates from the said university correlated with Physical Therapy and Occupational Therapy Licensure Examination results. From the results, the researchers hoped to determine whether internship grades affect a graduate's probability of passing the examination.

Methods

Researchers used a retrospective correlation design to test for a direct correlation between the final internship grades and Physical Therapy and Occupational Therapy Licensure Examination passing rates of graduates. The study aimed to determine a relationship between these two variables.

Data were obtained from a private college in Metro Manila from three batches of graduates. Internship grades were requested from the Internship Coordinator after obtaining permission from the Dean, while board examination results were requested from the Professional Regulation Commission. Included in the study were graduates of BS Physical Therapy from 1) batches 2010-2012 who 2) took the board examination for the first time and 3) whose internship and board examination grades were available. The Internship Coordinator assisted in pairing the internship grades and the board exam results for each graduate and coding them to maintain confidentiality. The researchers tabulated the data and ran it through Pearson Product Moment Correlation and computed for R using SPSS ver. 19 with the assistance of a statistician. The data were also quantified using an odds ratio analysis to determine the probability of passing the board exam based on internship performance.

Results

The internship grades and board examination results of 72 PT graduates were collected based on the inclusion and exclusion criteria. Their grades and examination results are summarized in Tables 1 and 2. The results of their internship grades were then cross- tabulated against their exam results (Table 3, Figure 1). Only 2% of graduates who passed their internship failed the board examination whereas 32% of graduates who failed their internship also failed in the subsequent examination. The data show that of the 88.9% (64 of 72 examinees) who passed the board examination, 76.6% passed their internship program. Even more glaring is that of the remaining 8 examinees who did not garner a passing mark on their first attempt, 87.5% also failed their internship grade.

These results were then quantified using an odds ratio (Table 4) and showed that a graduate who passed their internship was 22.9 times more likely to pass the board examination. Correlation was measured using Pearson Product Moment

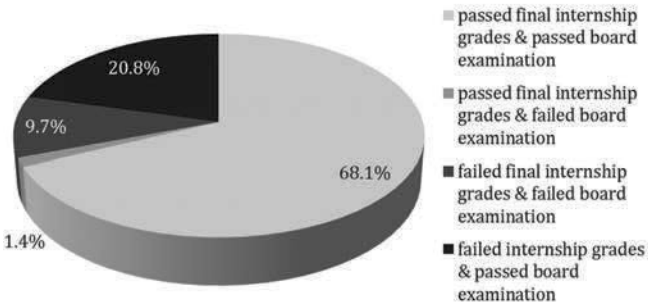

Figure 1. Percentage of PT graduates in the final internship grade and PT-OT board examination result from batch 2010- 2012.

Table 1. Performance in internship grades of PT graduates, batches 2010- 2012.

Final Grades in Internship	Batch							
	2010		2011		2012		Total	
	f	%	f	%	f	%	f	%
70.41 to 74.99 (Failed)	4	16	11	44	7	31.8	22	30.6
75.00 to 79.99 (Passed)	20	80	13	52	13	59.1	46	63.9
80. 00 to 83.38 (Passed)	1	4	1	4	2	9.1	4	5.6
Total	25	100	25	100	22	100	72	100
Mean Grade	77.01		75.51		76.54		76.35	

Note: frequency (f) means no. of participants. Percentages and means were computed within batch, except for total column which were based on the total number of cases.

Table 2. Performance in the PT-OT board examination of PT graduates, batches 2010- 2012.

Board Examination Result	Batch							
	2010		2011		2012		Total	
	f	%	f	%	f	%	f	%
67.25 to 69.99 (Failed)	0	0	1	4	2	9.1	3	4.2
70.41 to 74.99 (Failed)	2	8	2	8	1	4.5	5	6.9
75.00 to 79.99 (Passed)	14	56	20	80	18	81.8	52	72.7
80. 00 to 83.38 (Passed)	9	36	2	8	1	4.5	12	16.7
Total	25	100	25	100	22	100	72	100
Mean Grade	78.81		76.89		75.88		77.25	

Note: frequency (f) means no. of participants. Percentages and means were computed within batch, except for total column which were based on the total number of cases.

Table 3. Cross-tabulation of Internship performance and board examination performance and their odds ratio estimate.

Internship	Board Examination				Total	
	Passed		Failed			
Passed	49	68.1%	1	1.4%	50	69.5%
Failed	15	20.8%	7	9.7%	22	30.5%
Total	64	88.9%	8	11.1%	72	100.0%

Table 4. Odds-ratio estimate.

	Value	95% Confidence Interval	
		Lower	Upper
Odds Ratio for Performance in Internship (Passed/Failed)	22.867	2.601	201.004
For cohort Performance in the Board Examinations = Passed	1.437	1.077	1.917
For cohort Performance in the Board Examination = Failed	.063	.008	.481
N of Valid Cases	72		

Note: Cohort means group of respondents (PT graduates)

Correlation and showed a moderate correlation (0.530, P = 0.001) between internship grades and board examination results. A linear representation of this correlation is illustrated in Figure 2.

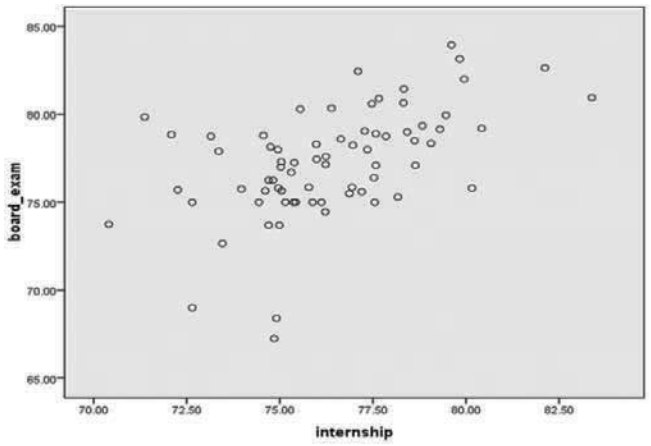

Figure 2. Correlation between performance in internship and performance in the PT-OT board examinations of PT graduates, batches 2010- 2012.

Discussion

Many studies have attempted to link performance in a physical therapy program to board examination results through a variety of parameters including grades in basic sciences, and grade point average or general weighted average. As the final grading level for students, internship grades was an unexplored, yet interesting avenue, to determine another indicator of probability for success in the board examination.

The results of the Pearson Product Moment Correlation may have shown a positive moderate correlation, but it was significant enough to reject the null hypothesis, thereby affirming the hypothesis that academic performance during the internship is a viable predictor in determining board examination results, with those who pass the internship nearly 23 times as likely to obtain a passing grade on their first attempt.

The study did not look into other factors that may have played into board examination performance such as personal factors and environment, length of review time, review center attended, school curriculum, and other possible factors. For future studies, the researchers recommend that more batches be included to increase the sample size, as well as to improve homogeneity of other factors pertinent to both internship grades and board examination results, such as school curriculum, review center attended, duration of review and others.

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Construct validation study of the filipino-translated shoulder rating questionnaire among filipino patients in the national capital region

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Abstract

Background A number of instruments have been developed to measure the quality of life in patients with various conditions of the shoulder. This study aimed to construct validate a Filipino translation of the Shoulder Rating Questionnaire (SRQ) to provide physical therapists a reliable assessment tool on the functional status of patients diagnosed with shoulder conditions.

Methods This study used construct validation to test the Filipino-Translated Shoulder Rating Questionnaire among Filipino patients medically diagnosed with shoulder conditions in rehabilitation centers in NCR. Eligible participants who were diagnosed with any type of shoulder condition were included. The English version of Shoulder Rating Questionnaire was translated to Filipino and was again re-translated to English to ensure validity of each of the items cited in the questionnaire.

Results A high significance was observed between each factor after revealing Bartlett's Test of Sphericity of .000. However, when the sum of squared loading is rotated it gives a lower percentage results.

Conclusion This study aimed to construct validate the SRQ to provide Filipino physical therapists a reliable assessment tool on the functional status of patients diagnosed with shoulder conditions.

Key words: Original Shoulder Rating Questionnaire (ORSQ), Filipino-translated Shoulder Rating Questionnaire (FTSRQ), Patients with shoulder condition

In recent years, researchers have found that the shoulder joint is one of the regions in the body where pain is seen and managed in a primary care setting.[1] The Philippines is one of the countries where work-related injuries are commonly seen. A blue-collar worker may lose his job if shoulder pain hinders him in performing his work properly. In addition, the white-collar worker may experience back pains which may decrease his productivity.[2] A number of instruments have been developed to measure the quality of life in patients with various conditions of the shoulder. However, there is no functional assessment tool designed for patients used in the local clinical setting.[1] In 1999, non-disease-specific shoulder questionnaires in English were of particular interest among professionals because of their validity. Other self-completed non-disease-specific shoulder questionnaires in English and published in peer reviewed journals since 1990 were identified by a Medline search in 1999, augmented by citation checking. These were the Shoulder Pain and Disability Index (SPADI), Simple Shoulder Test (SST), United Kingdom Shoulder Disability Questionnaire (SDQ-UK), American Shoulder and Elbow Surgeon's Shoulder Assessment Form (M-ASES), Oxford Shoulder Score (OSC), Subjective Shoulder Rating System (SSRS), Shoulder Rating Questionnaire (SRQ), and Dutch Shoulder Disability Questionnaire (SDQ-NL). Four questionnaires were noteworthy based on their suitability for use in a primary care setting, as well as for their face and content validity: SDQ-NL, SDQ-UK, SPADI and SRQ.

The Shoulder Rating Questionnaire (SRQ) is a 21-item assessment tool used to evaluate the functional status of the shoulder. Unlike other forms whose questions pertain to pain alone, the SRQ contains questions about different activities concerning a patient's daily activities, work and recreation. Only the SRQ includes items regarding work[1], and is the most responsive overall to true change. The over-all scale and each domain were prospectively tested for validity, reliability and responsiveness to clinical change. The self-administered shoulder questionnaire was found to be valid, reliable and responsive to clinical change. These qualities make it a useful instrument for the prospective assessment of the outcome of treatment of disorders of the shoulder.[3]

Early functional assessment of the shoulder among patients complaining of pain will provide physical therapists with adequate information to formulate a plan of care. Through the use of an assessment tool, the functional status of the shoulder can be assessed based on many domains, one of which is pain, a common symptom in shoulder conditions. This study aimed to construct validate the SRQ to provide Filipino physical therapists a reliable assessment tool on the functional status of patients diagnosed with shoulder conditions. Hence, the investigators wanted to know if a Filipino-translated SRQ would still be a valid assessment tool.

Methods

This study used Construct Validation to test the validity of the Filipino-translated Shoulder Rating Questionnaire (FTSRQ) among Filipino patients diagnosed with shoulder conditions in rehabilitation centers in the National Capital Region. The study was approved by the faculty of the College of Physical Therapy and by the Institutional Review Board.

The study was conducted in various rehabilitation centers in National Capital Region: UERMMMC Rehabilitation Center and UERMMMC Clinic and Training Center, Veterans Memorial Medical Center, St. Jude General Hospital, Quirino Memorial Medical Center, Quezon City Medical Center, Philippine Sports Commission, Religious of the Virgin Mary, St. Vincent General Hospital, St. Camillus Rehabilitation Center, Marikina Healthy PT Clinic, Health Cube, Salve Regina General Hospital and Parañaque Medical Center. Eligible participants were patients diagnosed with any type of shoulder condition, 15 years or older, underwent physical therapy intervention and complained of shoulder pain, had difficulty in activities of daily living which included movement of the upper extremities such as during bathing and combing hair, and had limited active/passive shoulder range of motion which inhibited the patient from work, athletic and recreational activities. Patients were excluded if he/she had more than one diagnosis and had any other existing conditions and complications (e.g. back pain, neck pain, CVD, pulmonary disease etc), had an impaired cognition, and was unable to read and comprehend. Eligible participants were asked to voluntarily sign an informed consent.

The Shoulder Rating Questionnaire (SRQ) included six separately scored domains: 1) global assessment, 2) pain, 3) daily activities, 4) recreational and athletic activities, 5) work, and 6) satisfaction. A final, non-graded domain allowed the patient to select two areas in which he or she believed improvement was most important. The English version of SRQ was translated to Filipino by a professor with a masteral degree in Filipino. The questionnaire was again re-translated to English by a professor with a masteral degree in English to ensure validity of each of the items cited in the questionnaire. The Filipino-translated SRQ was pre-tested on five eligible participants who were not included in the study and modified. Twenty questions were revised to improve clarity.

Eighty participants from the various rehabilitation centers were made to answer the modified version of the Filipino-translated SRQ after being given instructions by the investigators regarding the contents of SRQ and how it would be answered. All completed questionnaires were immediately encoded into a computerized data base using Microsoft Excel 2007, and analyzed using SPSS version 17.0. Factor analysis using principal component extraction with varimax rotation was used to identify and select valid questions from the SRQ.

Results

The demographic characteristics of the 80 participants are shown in Table 1. The mean age was 35.2 years; there were more women (n=42) than men (n=38). Frozen shoulder, tendinitis and sports injuries accounted for more than two-thirds of the shoulder conditions among the participants.

Table 1. Demographic characteristics of the participants.

Characteristics	% Distribution
Gender:	
Male	47%
Female	53%
Age:	
<30 y/o	28.75%
31-45 y/o	25%
46-60 y/o	31.25%
>60 y/o	15%
Employment:	
Employed	62.50%
Unemployed	37.50%
Shoulder Condition:	
Arthritis (OA/RA)	8.75%
Dislocation	10%
Fracture	12.50%
Frozen Shoulder	25%
Sport Injuries	17.50%
Tendinitis	20%
Rotator Cuff Tear	6.25%

Table 2 shows the communalities and the rotated factor loadings of each component. There were five factors extracted after using principal component analysis using Kaiser's criterion, with an average communalities of 0.81. When extracted, sums of squared loadings revealed variances of 44.36%, 14.77%, 9.41%, 7.36% and 5.12%, respectively. To further optimize and equalize the factors, sums of squared loading was rotated, resulting in variances of 23.57%, 20.44%, 13.48%, 12.00% and 11.52%, respectively. Sample size was found to be acceptable after using Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO-MSA) with a value of 0.52. A high significance was observed between each factor after revealing Bartlett's Test of Sphericity of zero.

After extracting the factors, the investigators looked at the pattern of the variables loaded in each factor. This determined if the construct of the FTSRQ was the same as the original SRQ. Factor 1was named as "work domain" and included questions 11, 16, 17, 18 and 19 whose common theme was the patient's difficulty during work brought about by his shoulder

Table 2. Eigenvalues after extraction and after rotation.

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	Variance%	Cumulative%	Total	Variance%	Cumulative%	Total	Variance%	Cumulative %
1	8.873	44.364	44.364	8.873	44.364	44.364	4.714	23.571	23.571
2	2.953	14.766	59.129	2.953	14.766	59.129	4.088	20.441	44.012
3	1.882	9.411	68.540	1.882	9.411	68.540	2.697	13.487	57.499
4	1.472	7.362	75.903	1.472	7.362	75.903	2.401	12.007	69.506
5	1.025	5.124	81.027	1.025	5.124	81.027	2.304	11.521	81.027

Table 3. Comparison of SRQ to FTSRQ.

DOMAIN	ORSQ	FTSRQ
1	Global assessment Q1	Perception on pain Q5 & Q20
2	Pain Q2, Q3, Q4, & Q5	Pain during activities Q3, Q9, Q10, & Q13
3	ADL Q6, Q7, Q8, Q9, Q10, &Q11	ADL Q1, Q6, & Q8
4	Sports Q12, Q13, &Q14	Work Q11, Q16, Q17, Q18, &Q19
5	Work Q15, Q16, Q17, Q18, & Q19	
6	Satisfaction Q20	

condition. Questions 3,9,10 and 13 loaded under Factor 2 which was named "pain during activities domain", as the pattern of questions revealed different activities during which the patient developed pain. Question 8 loaded alone on Factor 3; this remained unnamed since there was only one question under it. Factor 4, named as "activities of daily living (ADL) domain", consisted of questions 1 and 6. Lastly, questions 5 and 20 comprised Factor 5 named "perception on pain". The investigators looked at the individual score of each of the variables that loaded in each factor; questions with scores below 0.6 were excluded. The pattern of the variable loadings showed the common theme of the questions that were regrouped differently from the original SRQ as seen in Table 3.

Discussion

The Shoulder Rating Questionnaire is one of the assessment tools that have received recognition because of its good validity, reliability and responsiveness in detecting clinical change. The questions included on the SRQ touches on different domains of a patient with a shoulder condition and thus make it a useful instrument for knowing their functional capacity. The primary investigators validated the construct of the SRQ to know if the questions on the original questionnaire would still fall under the same factor or category after it has been translated to Filipino. Sample size revealed an acceptable value of 0.524 using the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy. A split-half test was also done to further strengthen the validity of the questionnaire. Internal consistency using Cronbach's alpha showed high correlation (0.914).

Principal Component Analysis using Kaiser's criterion was done for factor analysis and extraction. SPSS extracted 5 factors that showed eigenvalues over 1 and have relatively large amounts of variance (44.364%, 14.766%, 9.411%, 7.362% and 5.124%) compared to others. Orthogonal rotation using varimax was then used to further improve the interpretability of the factors. After rotation, variance of percentage became 23.57%, 20.44%, 13.48%, 12.00% and 11.52%, significant values which further determined the accuracy of the 5 factors. Table 2 shows the eigenvalues associated with each linear component (factor) after extraction and after rotation. After factor extraction, variable factor loading was then analyzed to see which variables (questions) loaded unto the same factor. Variables whose loadings were below 0.6 were suppressed to assist in the interpretation of the factors. By default, a value of 0.1 is provided by SPSS; however it can be helpful to increase the default value of 0.1 to any value reflecting the expected significant factor loading value given the sample size. Looking now at the content of the questions that load onto the same factor to identify common themes, questions from the original SRQ fell down on different factors in the Filipino-translated SRQ.

Individual variables or questions from the SRQ were cited as Q1 (representing Question 1) and so forth. A brief description of the question followed every variable. Factor 1 included 5 variables: Q19 (frequency of changing style of work), Q11 (difficulty in lifting groceries), Q17 (frequency of inability to work carefully), Q16 (frequency of inability to work casually), and Q18 (frequency of working less than a day). Looking at the common theme of the questions regarding the impact of a shoulder condition on a patient's occupation, the investigators named this domain "work". Four variables loaded highly into factor 2: Q13 (difficulty in throwing a ball), Q10 (difficulty in scratching low back), Q3 (pain during activities), and Q9 (pain in reaching overhead cabinets). The questions that were included resembled the pattern included in the Shoulder Pain and Disability Index (SPaDI), e.g., pain in reaching high-shelves, touching the back of the neck. This domain was named "pain during activities". Factor 4 consisted of Q6 (ability to use shoulder during personal/household chores) and Q1 (rate shoulder affectation). Q6 is a broad question that asked if a patient had the ability to use his/her shoulder during any specific personal or household chore. Q1 on the other hand asked the patient to rate how his shoulder affected all of his activity. Literature shows that restrictions in daily activities can be attributed to pain.[4] In determining the patient's functional difficulty in doing personal/household chores, the investigators named this domain "activities of daily living" (ADL). Q20 (rate of shoulder improvement) and Q5 (frequency of intense shoulder pain) loaded under factor 5, named as "perception of pain". This domain identified the subjective perception of pain of a patient regarding his shoulder condition. Factor 3 has only 1 variable that loaded with a significant value: Q8, which asked if a patient

had difficulty in combing his hair. Q15 (primary work on previous month) and Q2 (pain at rest) also loaded unto this factor but were excluded because of low scores indicating they did not correlate well with this factor.

After factor analysis, four questions (Q14, Q15, Q2 and Q4) were excluded because of their low scores; they did not load into any of the factors. Questions 14 asked the patient to list one activity (recreational or athletic) and select the degree of limitation he/she had in doing this. The vague presentation of the question however may have confused participants in an activity that was viewed as a recreational to one and athletic to another.[5] Question 15 consisted of choices of what may have been the main form of work of the participant. Confusion may have arisen in answering this item because of the possible overlapping of answers. A patient's paid work for example (choice A) may be a housework one (choice B). It is noteworthy that there were seven choices for question 15 on the OSRQ[3] but for validation purposes the researchers combined them to five.

Question 2 asked the patient to describe pain in the shoulder at rest. Most etiologies produce shoulder pain during activities.[6] Considering that 45% of the participants had shoulder conditions whose pain usually occurred during activities, the low scores made this item load insignificantly. Question 4 asked how often the participants had difficulty sleeping at night due to shoulder pain. Although literature cites that pain including that from chronic rheumatic diseases causes sleep disturbances[7], the time factor (during past month) may have made it difficult for participants to recall the frequency of pain especially those with memory problems.[8] Variables that loaded unto two factors were also excluded to avoid inconsistencies (Q7, Q12). Question 12 asked the participant to describe shoulder function during recreational or athletic activities. Certain recreational activities, perceived as being less stressful both physically and mentally, could include participation in sports such as football and aerobics.[5] Inconsistent answers as to whether the participant had an athletic or recreational activity in mind may have been a factor why this question loaded under two factors.

It was noted that factor 3 had only one question, and the domain therefore could not be named. Information from the participants revealed that they did not complain of pain when combing their hair but rather found it difficult to do because of limitation of motion. Under this premise, the researchers moved Q8 to the ADL domain. A split-half validity test was done after principal component analysis. This was done by doing factor analysis using only half of the sample size (n=40), which were randomly picked. Reliability was still high using Cronbach's alpha (0.889). Only factors with high correspondence of factor loadings across the two subsamples were retained. Results showed that variables under factors 1 and 5 had consistently high loadings; they retained all questions from the initial factor analysis. From here on, several inconsistencies were observed by the researchers.

Factor 2 retained Questions 9, 10 and 13, however questions 4 (difficulty sleeping at night due to pain), 5, and 20 also loaded under this factor. Seventy percent of patients suffering from medical disorders report having trouble sleeping because of their pain, usually awakening at night because of sudden movement.[7] This may be the reason why Q4 loaded under questions asking the patient if there was difficulty sleeping at night.

Originally, only 2 questions fell under factor 3: Q8 and Q2. After a split-half test was done, questions 3, 7 (difficulty don on/don off shirt) and 14 also loaded under this factor. Q14 asked the patient to list an activity and select the degree of limitation he/she had in performing it. Differences in the activities chosen (recreational or athletic) may have produced varied results as the participant had different perceptions if the activity could be done at rest or during shoulder movement. For example, a patient who chose badminton (athletic) which requires shoulder movement differs much from one who chose chess (recreational), an activity that doesn't normally require shoulder movement.

After factor analysis, comparing the construct of the FTSRQ with the SRQ showed many differences (Table 2). First, the SRQ consists of six domains compared to four on the FTSRQ. The absence of a recreation/sports domain on the FTSRQ was delineated by the fact that most participants in the study did not answer this section; it was simply stated in the SRQ to skip items not applicable to a patient. This may also be explained since most of the participants randomly selected using the split-half analysis answered this category, but was considered insignificant when used in the whole group. The spreading of the questions unto the different factors

can be explained that after translation, questions with a common theme on a different domain clustered because they assess a similar pattern of domain. Q11 (difficulty lifting groceries) for example, was a question under the ADL domain in the SRQ, but loaded highly on the work domain in the FTSRQ. This can be explained by the pattern of questions that were under the work domain in the FTSRQ, which counted lifting groceries as part of assessing the degree of shoulder limitation of a patient in his occupation. The pattern of the questions under the pain during activities domain resembled those of the SPaDI, which may account for the different construct of the categories. Overall, the construct validation done showed that certain questions (questions 5, 11, 16, 17, 18, 19 and 20) have high factor loadings although different factors were identified with different sets of variables that loaded under them.

The objective of this study was to validate the construct of the shoulder rating questionnaire when administered to Filipino patients diagnosed with a shoulder condition. Results of this study showed that the questions in the SRQ were categorized to different factors when it was translated to Filipino. This means that the FTSRQ may be weak to measure what it is supposed to measure since the questions were re-organized after it was translated and analyzed using factor analysis. Certain factors may have affected this study: the wide age range of the participants, less than ideal sample size, and that the participants were not allowed to clarify the items in the questionnaire. However, The FTSRQ was found to be valid and reliable with regard to its internal consistency.

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A retrospective cohort study of ankle inversion sprain injury and leg dominance among runners*

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Abstract

Introduction The overall objective of the study was to determine the relationship of ankle inversion sprain injury in the dominant and non-dominant leg among runners.

Methods This was a retrospective cohort study to test the relationship of ankle inversion sprain injury and leg dominance among runners. Thirty-three runners with ankle inversion sprain in the dominant leg and 27 runners who had ankle inversion sprain in the non-dominant leg were recruited from various universities and runner's clubs/associations. Patients who had medical records or charts in a clinic within Metro Manila were also included. The relative risk was computed to determine the strength of association between ankle inversion sprain injury and the risk factors. Linear regression was used to determine the strongest indicator of ankle inversion sprain injury in the dominant and non-dominant leg, in relation to age, weight and height. An independent t-test was done to test the significance of means of two groups.

Results Runners aged 15-32 years (low age; RR = 1.14), who weighed 61-90 kg (high weight; RR = 1.11) and had a height of less than 170 cm (low height; RR = 1.08) were more likely to sustain ankle inversion sprain. The strongest indicator of ankle inversion sprain in both the dominant and non-dominant leg was low age (15-32 years). A height less than 170 cm (low height) was a significant factor in the dominant leg.

Conclusion There was a relationship between ankle inversion sprain injuries and low height (≤ 170 cm) in the dominant leg but not in the non-dominant leg. Low age (15-32 years) was the strongest indicator of ankle inversion sprain in both the dominant and non-dominant leg, however; it had a low association with a significance value of 0.18. There was an additional 25.9% increase in the risk of having ankle inversion sprain in the dominant and non-dominant leg if a runner had low age.

Key words: ankle inversion sprain injury, leg dominance, runner

Ankle injury is one of the most common acute soft tissue injuries[1] and is considered as the second most common injury location, next to the knee.[2] Athletes, on the other hand, are predisposed to ankle injury since they engage mostly in activities like jumping and running which have been known to be the most common mechanism of injury. Among the injuries of the ankle, inversion injury most commonly occurs in athletes. The injury involves damage to the lateral ligaments, which consist of the anterior talofibular ligament, calcaneofibular ligament, and the posterior talofibular ligament; and ultimately results in pain, swelling and limitation of movement.[3]

There are a growing number of people worldwide who engage in sports activities and exercises. Because of its convenience, running may be the most common exercise done by many people and the Philippines is no exception. Nowadays, many Filipinos join marathons and "fun runs" for charitable causes.

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Besides its beneficial effects on health, running may cause injuries, especially to the lower extremities since the running gait involves 50 to 70 foot strikes per minute, each with a force of 3 to 8 times the runner's body weight, depending on the running terrain.[6]

During running, the foot is subjected to a high loading twice the body weight.[4] In this gait, the ankle is in about 10º dorsiflexion during heel strike and rapidly dorsiflexes to 25º dorsiflexion. The rapid dorsiflexion is followed immediately by plantar flexion, which continues from the remainder of stance phase to the initial part of the swing phase. Plantar flexion reaches a maximum of 25º in the first few seconds of the swing phase. Throughout the rest of the swing phase the ankle dorsiflexes to reach about 10º in the late swing in preparation for heel strike.[5] A running gait that involves 50 to 70 foot strikes per minute, each with a force of three to eight times the runner's body weight, depending on the running terrain, will cause running injuries, particularly in the lower extremities.[6]

Leg dominance, on the other hand, may be a risk factor for lower extremity injuries because most athletes place a greater demand on the dominant leg which results in increased frequency and magnitude of movements of the knee and ankle, especially during high-demand activities. Current literature is divided with regards to leg dominance as a risk factor for suffering an ankle sprain.[8] The objective of this study was to determine if there is a significant relationship of age, gender, height and weight with ankle inversion sprain injury in the dominant leg and non-dominant leg among runners.

Methods

The study protocol was approved by the UERMMMCI-College of Physical Therapy Ethics Review Board Committee. The information sheet and the written consent form, including purpose and procedures of this study were explained.

This retrospective cohort study was conducted using subjects from the Mega Clinic, University of the East Manila, University of Santo Tomas, Ateneo de Manila University, De La Salle University, Adination Runner's Club, Bhoy Runner's Society, Run Manila Society, A Runner's Circle, Team Bald Running Club, Happy Feet Club and Running Bananas Club. A runner was eligible if he/she fulfilled the following criteria: 1) age 15-50 years; 2) ran a minimum of 20 km per week on a regular basis; 3) ran consistently for at least one year; and 4) had a history of ankle inversion sprain injury. A runner was excluded if he/she had: 1) injury to the ankle other than inversion sprain; 2) injury or any condition that would limit joint movement in any part of the body; 3) severe medical or orthopedic complications; 4) severe co-morbidities including degenerative diseases of the knee (osteoarthritis), rheumatoid arthritis, or any musculoskeletal or cardiovascular disorders.

Data were obtained through combination of review of medical records, telephone calls, and/or questionnaires that determined their age, gender, height, weight and affected leg with ankle inversion sprain injury. An assessor who was not part of the research team screened the participants for eligibility. Eligible participants were classified according to the age (45-50, 39-44, 33-38, 27-32, 21-26 and 15-20 years), weight (81-90, 71-80, 61-70, 51-60, 41-50 and ≤ 40 kg), height (191-200, 181-190, 171-180, 161-170, 151-160 and ≤ 150 cm), gender, and ankle inversion sprain acquired on the dominant or non-dominant leg based on their handedness. The data groups in the tally sheet were further divided as: high age (33-50 year), low age (15-32 years), high weight (61-90 kg), low weight (≤ 60 kg), high height (171-200 cm) and low height (≤ 170 cm).

All data were encoded in Microsoft Excel and SPSS Statistical Package ver. 17 for analysis. The rate of occurrence for each variable (age, weight, height, gender, and ankle inversion sprain on the dominant and non-dominant leg) item was obtained. Test for the strength of association between ankle inversion sprain injury in the dominant leg and non-dominant leg, in relation with high age, low age, high weight, low weight, high height and low height was obtained using risk ratio. Multivariate analysis through linear regression was used to determine the strongest predictor among the variables mentioned. An independent t-test was used to determine the relationship between ankle inversion sprain in the dominant and non-dominant leg and age, weight and height.

Results

A total of 60 runners were included in the study, 33 of whom had ankle inversion sprain in the dominant leg and 27 in the non-dominant leg. A flow of subject participation is illustrated in Figure 1.

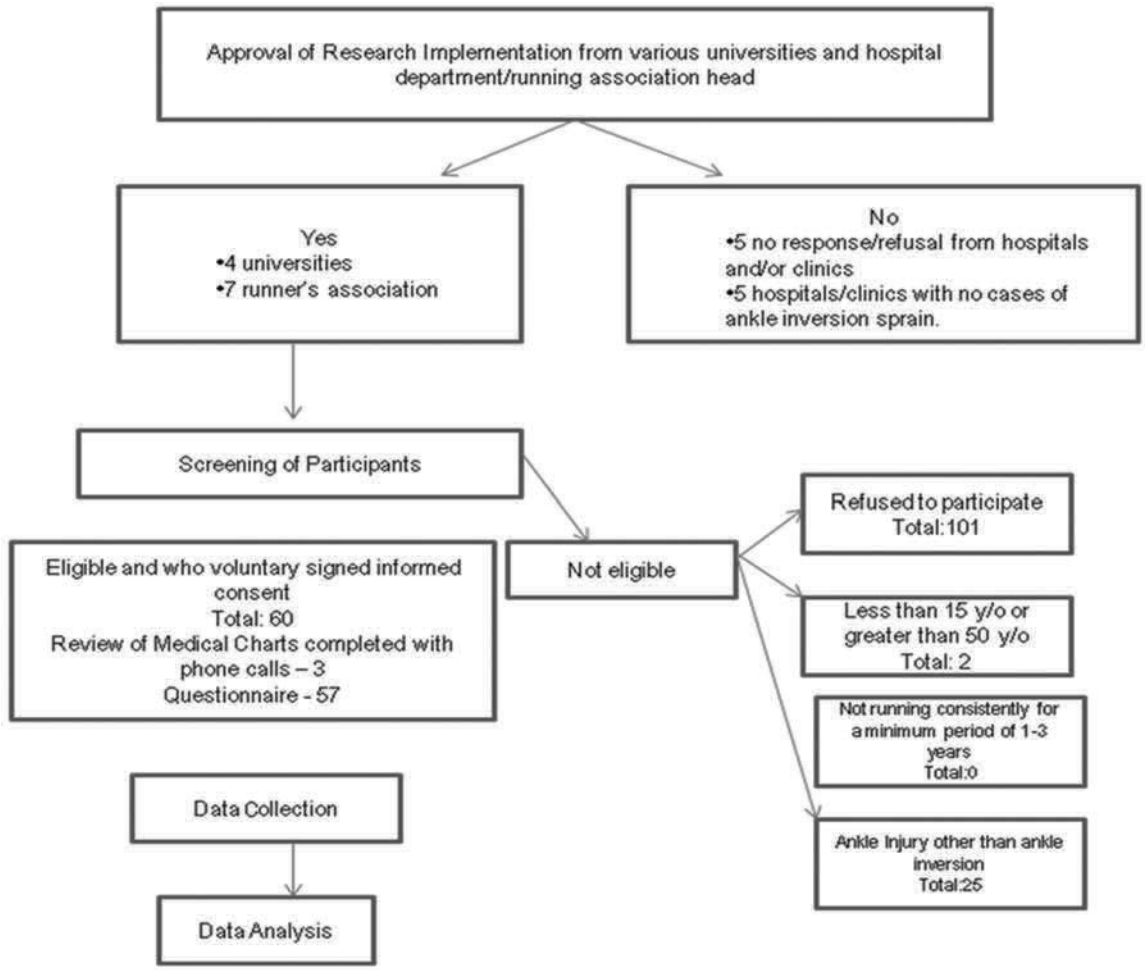

Figure 1. Research flow of the study participants.

As shown in Table 1, the age group 15-20 years had the highest number (45. 5%) of ankle inversion sprain in the dominant leg while the age group 21-26 years had the highest number (48.2%) among runners with ankle inversion sprain in the non-dominant leg. The weight bracket 61-70 kg had the highest incidence (27.3%) in the dominant leg while the 51-60 kg and 61-70 kg groups had the highest occurrence (33.3%) in the non-dominant leg. The occurrence of ankle inversion sprain was highest in the height bracket 161-170 cm (69.7% for the dominant leg and 37.0% for the non-dominant leg). Majority of runners who had ankle inversion sprain were males, 75.8% in the dominant leg and 70.4% in the non-dominant leg.

The variables associated with ankle inversion sprain were low age (RR = 1.14), high weight (RR = 1.11), and low height (RR = 1.08) as shown in Table 2. Runners aged 15–32 years were 1.14 times more likely to have ankle inversion sprain than runners aged 38–50 years (high age). Runners weighing 61–90 kg (high weight) were 1.11 times more likely to have ankle inversion sprain than those runners with a weight of ≤ 60 kg (low weight). Runners with low height (≤ 170 cm) were 1.08 times more predisposed to ankle inversion sprain than runners with a high height.

Linear regression showed that the strongest indicator of ankle inversion sprain injury in both the dominant and non- dominant leg was low age. However; it had a low association with P = 0.145. Low age also produced a 25.9% increase in the risk of ankle inversion sprain in the dominant and non-dominant leg. The mean age, weight and height of the dominant and non-dominant leg groups were

Table 1. Demographic characteristics of runners.

Variables	Dominant Leg n=33		Non - Dominant Leg n=27	
AGE				
• 45 - 50 y/o	0	0%	0	0%
• 39 - 44 y/o	0	0%	1	3.70%
• 33 - 38 y/o	1	3.03%	3	11.11%
• 27 - 32 y/o	5	15.15%	3	11.11%
• 21 - 26 y/o	12	36.36%	13	48.15%
• 15 - 20 y/o	15	45.45%	7	25.92%
WEIGHT (kg)				
• 81 - 90	2	6.06%	1	3.70%
• 71 - 80	8	24.24%	4	14.81%
• 61 - 70	9	27.27%	9	33.33%
• 51 - 60	7	21.21%	9	33.33%
• 41 - 50	7	21.21%	4	14.81%
• ≤ 40	0	0%	0	0%
HEIGHT (cm)				
• 191 - 200	0	0%	0	0%
• 181 - 190	1	3.03%	0	0%
• 171 - 180	7	21.21%	8	29.62%
• 161 - 170	23	69.70%	10	37.04%
• 151 - 160	1	3.03%	8	29.62%
• ≤ 150	1	3.03%	1	3.7%
GENDER				
• Male	25	75.75%	19	70.37%
• Female	8	24.24%	8	29.63%
HISTORY				
• Completed with phone calls	3	9.09%	0	0%
• Completed without phone-calls	30	90.90%	27	100%

Rate of occurrence/percentage of runners with ankle inversion sprain in the dominant and non-dominant leg according to age, height, weight, gender

compared in Table 3. Levine's test for equality of variance and independent t-test showed a significant association between low height and ankle inversion injury (P = 0.003, t-test, unequal variance) as shown in Table 4. Age and weight were not significant predictors of injury.

Discussion

Ankle inversion sprain is a common injury in runners. The injury involves damage to the lateral ligaments, and results in pain, swelling, and limitation of movement.[3] Ankle inversion sprain injury usually occurs during loading and unloading phase but not when ankle is fully loaded. It is also influenced when foot is plantar-flexed and forefoot

Table 2. Relative risk for the strength of association between ankle inversion sprain in the dominant and non-dominant leg and risk factors (age, weight and height).

Variables	Relative Risk
High Age (33-50 y/o)	0.205
Low Age (15-32 y/o)	1.138
High Weight (61-90 kg)	1.110
Low Weight (0-60 kg)	0.881
High Height (171 - 200 cm)	0.818
Low Height (0 - 170 cm)	1.077

is made to contact the ground first.[7] On initial contact of the foot the ankle is in closed kinetic chain (DF) wherein the joint is stabilized. Pronation of the foot is influenced by the ground reaction forces against the calcaneus as the lower extremity receives weight (subtalar joint eversion and abduction, ankle mortise PF, talar adduction, and IR of tibia). Foot ground pressure distribution on each foot varies during different phases of gait. It can be used to evaluate corresponding pressure intensity on foot anatomy. Pressure values and distribution can be used to determine resultant forces applied to different foot regions that may be useful for further analysis.[8] During the initial contact of foot in the stance phase of gait, when the plantar pressure is laterally situated, there would be more risk in sustaining ankle inversion sprain.[7]

Common risk factors included in this study were age, height, weight and leg dominance. Recent evidence showed that the dominant leg may be at

Table 3. Comparison of mean age, weight and height for ankle inversion injury in dominant and non-dominant leg groups.

	Ankle Inversion	N	Mean	Std. Deviation
High age	Dominant	1	37.0000	.
	Non-dominant	4	36.5000	2.38048
Low age	Dominant	32	21.2500	3.48268
	Non-dominant	23	22.7391	3.92217
High weight	Dominant	19	69.7368	9.91543
	Non-dominant	14	68.9286	5.25451
Low weight	Dominant	14	51.5714	5.30188
	Non-dominant	13	52.0769	3.88290
High height	Dominant	8	178.0000	4.65986
	Non-dominant	8	176.7500	1.75255
Low height	Dominant	25	165.2000	4.14327
	Non-dominant	19	161.2105	6.83601

Table 4. Statistical analysis for difference in means for age, weight, height for ankle inversion injury runners between dominant vs non-dominant leg group.

		Levine's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	T	Df	p value
High age	Equal variances assumed	.	.	.188	3	.863
	Equal variances not assumed	.	.	.		
Low age	Equal variances assumed	0.205	0.653	-1.484	53	0.144
	Equal variances not assumed			-1.455	43.977	0.153
High weight	Equal variances assumed	4.365	0.045	.277	31	0.784
	Equal variances not assumed			.302	28.586	0.765
Low weight	Equal variances assumed	4.844	0.037	-.281	25	0.781
	Equal variances not assumed			-.284	23.765	0.779
High height	Equal variances assumed	2.155	0.164	.710	14	0.489
	Equal variances not assumed			.710	8.941	0.496
Low height	Equal variances assumed	9.589	0.003	2.400	42	0.021
	Equal variances not assumed			2.249	27.827	0.033*

* - statistically significant at P=0.05

increased risk of injury because it is always used for kicking, pushing off, jumping or landing. Several risk factors studies have reported that leg dominance has an effect on lower extremity injury.[9] Leg dominance has been identified as a risk factor for lower extremity injuries because most athletes place a greater demand on the dominant leg which results in increased frequency and magnitude of moments on the knee and ankle, especially during high-demand activities.

This study found that there was a higher incidence of ankle inversion sprain in the dominant leg (n=33) than the non-dominant leg (n=27) in both males and females. There was also an increase in the frequency of runners with ankle inversion sprain in the age group 15-20 years, weight group 61-70kg, and height group 161-170cm in the dominant leg. In the non-dominant leg, the frequency was higher in the age group 21-26 years, weight groups 51-60kg and 61-70kg, and height group 161-170cm. Runners with low age, high weight and low height were more likely to sustain ankle inversion sprain. Based on linear regression, the strongest indicator of ankle inversion sprain in both the dominant and non-dominant leg was low age; however, independent t-test showed low height was more significantly associated with ankle inversion sprain in the dominant leg; there was no significant association in the non-dominant leg.

The determination of the relationship of ankle inversion sprain injury in the dominant leg to height would help physical therapists, sport trainers, and the runners to increase awareness in implementing injury prevention protocols in the dominant leg when the runner's height is ≤170 cm. This would also hold true for runners in the 15-32 year old bracket.

A limitation of this study was a lack of homogeneity in age, gender, weight and height variables of runners, although the participants came from the same population. Other limitations were low sample size and lack of studies that would support the results of this study. The determination of the association between the development of ankle inversion sprain injury in the dominant leg, in relation to height and age, will pave way for further studies. The results of this study could be utilized to develop future scoring systems in assessing individuals engaged in running and implementing injury prevention protocols.

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Parents' profile and level of early intervention physical therapy services rendered to children with physical disabilities*

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Abstract

Introduction Family-centered approach to early intervention, which is a part of special education, has been recognized through Republic Act 8980, known as the Early Childhood Care and Development Act. This study aimed to determine the perceptions of parents on family-centered early intervention physical therapy services for children with physical disabilities, and their relationship with the parents' profile.

Methods The study was conducted among parents of children six years old and below undergoing physical therapy services in Quezon City. The Measure of Processes of Care (MPOC-20) was used to measure parents' perceptions on the behaviors of their early intervention physical therapists and the staff of the institution where they receive the services. It has four domains, namely: providing information, enabling partnership, respectful and supportive care, and comprehensive and coordinated care.

Results Thirteen parents qualified and participated in the study. Based on the means of the MPOC-20, parents perceived a family-centered physical therapy approach. The study also revealed that there was no significant relationship between the parents' socioeconomic status and the level of early intervention physical therapy services on all domains of the MPOC-20.

Conclusion A consistent family-centered practice during early intervention is recommended for physical therapists and rehabilitation centers. Standardized program that will further its use for children with disabilities is also suggested.

Key words: MPOC-20, family-centered early intervention

One of the concerns of those who work with young children with special needs is early intervention defined as the provision of services, including physical therapy, occupational therapy, speech therapy, and/or educational services to children with developmental disabilities.[1]

The United States has mandated the provision of early intervention among infants and toddlers with physical disabilities through the Disabilities Education Act (IDEA) Part C which is explicitly family-centered. In the Philippines, the provision of early intervention services as a government policy is anchored on government agencies, namely the Department of Health (DOH) and the Department of Education (DepEd). It is aimed towards the prevention of occurrence and progression of disability among infants and children below six years old and early rehabilitation and education services for the young child found to have a risk of having disability or developmental delay. Republic Act (RA) 7277/ 9442, the Magna Carta for Disabled Persons, provides for the rehabilitation, self-development and self-reliance of persons with disabilities (PWDs) and their integration into the mainstream of society. The Special Education (SPED) Act of 2004 aims to provide information to parents about the full continuum of services and equip other caregivers

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and teachers with capabilities to identify, prevent, refer and intervene with the disabilities of children. Enhancing the role of parents and other caregivers is also offered under this law. RA 8980 or the Early Childhood Care and Development (ECCD) Act, promulgates a comprehensive policy and a national system for early childhood care and development (ECCD). It enhances the role of parents as the primary caregivers, other caregivers and educators of their children.

Despite these laws, provisions for a family-centered approach on early intervention services have not been specified, unlike in other countries where family-centered early intervention programs have been established. This situation directed the researcher to the questions: Are family-centered practices observed during an early intervention program, particularly physical therapy services, among children with physical disabilities? If so, how does parents' profile affect the level of physical therapy services during early intervention? Thus, this study was undertaken to determine whether there is a relationship between the parents' profile and level of early intervention physical therapy services among children with physical disabilities.

Methods

This study utilized a correlative research design. The respondents were limited to parents who had children six years old or younger with physical disabilities, who have been receiving early intervention physical therapy services for at least one year, starting 2003. The study was conducted at the Philippine Children's Medical Center (PCMC) and the Stimulation Therapeutic Activity Center (STAC) in Quezon City. Physical therapists from these two centers were asked to identify children aged six years and below undergoing physical therapy services in their centers. Purposive sampling was used.

Two questionnaires were used in this research. The first questionnaire was a researcher-made survey form to profile the parent-respondents and the children receiving early intervention physical therapy services. The second questionnaire was a standardized tool, the Measure of Processes of Care (MPOC-20), developed by the CanChild Centre for Childhood Disability Research at McMaster University (On, Canada). It measured the perceptions of the participants about their physical therapist and the organization providing early intervention physical therapy services to their child. Perceptions gathered were along four domains: 1) providing information, 2) enabling and partnership, 3) respectful and supportive care and 4) comprehensive and coordinated care. To ensure that the respondents had a clear understanding of the items, the questionnaire was translated to Filipino by a professor in Filipino from the University of the East Ramon Magsaysay Memorial Medical Center, Inc. The correlation between the independent and dependent variables was then measured.

Results

Respondents' Profile

Of the thirty-three children-patients screened, only 13 were eligible. The rest were excluded for receiving physical therapy services for less than a year. The parents of all 13 children consented to participate in the study. The children, aged 9 months to 6 years, consisted of 8 girls and 5 boys. (Table 1) The most common disabilities were cerebral palsy (61.5%) and muscular dystrophy (15%); no child had multiple disabilities. Symptoms were noted in half of the children between 3 and 9 months. Only one parent claimed that a developmental problem was noted in his child before birth. Most of the children were diagnosed at about the same age their parents noticed the symptoms. More than half of the children (54%) underwent physical therapy at the Physical Medicine and Rehabilitation Department of PCMC. Most (77%) of the children underwent physical therapy sessions twice a week and the rest had sessions three times a week.

Most of the 13 parents (77%) were mothers, of which 10 were housewives. Five of the parents were college graduates; the rest reached at least high school; 77% had monthly incomes of P15,000 or less. More than 2/3 had one or two children and came from urban areas. Eight children lived with both parents. The parents' profile is presented in Table 2.

Level of Early Intervention Physical Therapy Services as Perceived by Parents

Providing Information

Table 3 shows that providing information about the results of assessments had the highest mean score

Table 1. Profile of children with physical disabilities.

Variables	Frequency	Percentage
Age (months)		
0-3	-	-
3-6	-	-
6-9	-	-
9-12	4	30.8
12-24 (1-2 years)	4	30.8
24-48 (2-4 years)	4	30.8
48-72 (4-6 years)	1	7.7
Gender		
Male	5	38.5
Female	8	61.5
Diagnosis		
Cerebral palsy	8	61.5
Spina bifida	1	7.7
Muscular dystrophy	2	15.4
Multiple disabilities	-	-
Others	2	15.4
Age when symptoms of impairment or disability were noticed (months)		
0-3	1	7.7
3-6	4	30.8
6-9	3	23.1
9-12	2	15.4
12-24 (1-2 years)	2	15.4
24-48 (2-4 years)	-	-
48-72 (4-6 years)	1	7.7
Age diagnosed with disability or impairment (months)		
0-3	1	7.7
3-6	3	23.1
6-9	3	23.1
9-12	3	23.1
12-24 (1-2 years)	2	15.4
24-48 (2-4 years)	-	-
48-72 (4-6 years)	1	7.7
Early intervention physical therapy setting		
Physical Medicine & Rehabilitation Center	7	53.8
Community Based Rehabilitation	6	46.2
Frequency of physical therapy session		
Daily	-	-
Twice a week	10	76.9
Three times a week	3	23.1

Table 2. Profile of the parents.

Variables	Frequency	Percentage
Occupation		
housewife	10	76.9
business	2	15.4
teacher	1	7.7
Level of Education		
some high school	2	15.4
completed high school	4	30.8
some technical training	-	-
some college	2	15.4
completed college	5	38.5
graduate school	-	-
Family Income		
Php 0-7,000	6	46.2
Php 7,000-15,000	4	30.8
Php 15,000-25,000	3	23.1
Php 25,000-50,000	-	-
>Php 50,000	-	-
Number of children in the family		
1-2	8	69.2
3-4	3	23.1
5-6	1	7.7
Type of community		
Rural	4	30.8
Urban	9	69.2
Family Type		
single parent	2	15.4
two parents	8	61.5
extended family	3	23.1

(6.85), whereas making available to the parent information in various forms, such as a booklet, kit, video, etc. had the lowest mean score (1.38).

Enabling Partnership

Results showed that the provision of time for parents to talk with the therapists was provided to a great extent (score of 6.92). They also were given full explanation on the treatment choices for their child and were allowed to choose when to receive information and the type of information they wanted to a fairly great extent (score of 5.31).

Respectful and Supportive Care

As a whole, parents felt that they were respected to a great extent by the physical therapists that treated their child. However, most parents claimed that they

Table 3. Perceived level of early intervention services provided.

Domains of Care and Services Rendered	Mean	Descriptive Interpretation
Providing Information		
Provided by people		
- written information about what the child is doing in therapy	2.08	Very small extent
- written information about the child's progress	2.08	Very small extent
- results from assessments	6.85	Great extent
Provided by the organization		
- types of services offered at the organization in the community	5.92	Fairly great extent
- information on the child/s disability	6.23	Great extent
- opportunities for the entire family to obtain information	3.00	Small extent
- booklet, kit, video, etc	1.38	Not at all
- advice on how to get information or to contact other parents	1.92	Not at all
Enabling partnership		
- choose when to receive information and the type of information wanted	5.31	Fairly great extent
- fully explain treatment choices	5.31	Fairly great extent
- provide enough time to talk so the parent don't feel rushed	6.92	Great extent
Respectful and supportive care		
- look at the needs of the whole child	6.38	Great extent
- make sure that at least one team member is someone who works with the parent and family over a long period of time	6.54	Great extent
- plan together so all are working in the same direction	1.31	Not at all
- give information about the child that is consistent from person to person	6.69	Great extent
Comprehensive and coordinated care		
- help to feel competent as a parent	6.77	Great extent
- provide a caring atmosphere rather than just give information	6.54	Great extent
- provide opportunities to make decisions about treatment	2.38	Very small extent
- treat as equal rather than just as the parent of a patient	6.85	Great extent
- treat as an individual rather than as "typical" parent of a child with a disability	8.77	Great extent

were not involved in planning their child's intervention.

Comprehensive and Coordinated Care

The findings showed that equal services were provided to the disabled children to a great extent, except for the fact most of them were not given the chance to make decisions for their child; thus, there was no coordinated care. Some parents reported that they were not aware that they could make decisions for their child.

The mean scores on the MPOC-20 domains ranged from 3.69 to 5.86. *Comprehensive and coordinated care* had the highest mean score (5.86) followed by E*nabling Partnership* (5.85), and *Respectful and Supportive Care* (5.23). On the other hand, *Providing Information* had the lowest mean score (3.69). A summary of the descriptive data for the means of the MPOC-20 domains are presented in Table 4. The mean scores ranged from 3.69 to 5.86 (7 = to a great extent).

Table 4. Summary of means of level of early intervention services.

Domains of Processes of Care	Mean	Descriptive
Providing Information	3.69	Small extent
Enabling Partnership	5.85	Fairly great extent
Respectful and Supportive Care	5.23	Fairly great extent
Comprehensive and Coordinated Care	5.86	Fairly great extent

Relationship between Parents' Profile and Perceived Level of Early Intervention Physical Therapy Services

Table 5 shows the correlation between the parents' profile and their perception of early intervention physical therapy services. It shows that most of the parents' profile variables were not signiicantly correlated with early intervention physical therapy services except for occupation with *Providing Information* which showed moderate correlation. There was no significant correlation for the other variables.

Table 5. Correlation matrix of the respondents' profile and perceived level of early intervention physical therapy services.

Variables	PI *r*	EP *r*	RSC *r*	CCC *r*
Occupation	500	.334	.230	.232
Level of Education	-.093	-.149	-.019	.112
Family Income	-.158	-.071	-.284	.054
Number of Children	.337	-.019	.304	.035
Type of Community	.299	.151	.159	.024
Family Type	-.279	-.260	-.417	.206

Legend: P < 0.05; PI- Providing Information; EP- Enabling Partnership; RSC- Respectful and Supportive Care; CCC- Comprehensive and Coordinated Care

Discussion

The children in this study were diagnosed early since they were given medical attention at the same age when their symptoms of physical disability were noticed, indicating that most of the parents did not delay seeking medical help for their children. This result affirms the principle of early detection. Early detection leads to early intervention which helps alleviate the symptoms especially within the sensitive period which is the time when the child is more responsive to specific forms of experiences. Therefore, positive outcomes in the child are expected. No child younger than nine months received early intervention physical therapy services, suggesting that further dissemination of information about early detection and intervention to parents should be emphasized. Most of the children were observed by their parents to have symptoms of disability at the age of three to six months. This finding implies that promoting newborn screening system for certain conditions is important to avoid late detection of a developmental problem.

Most parents had low income levels but despite this, the parents still availed of physical therapy services for their disabled children. Majority of the respondents lived with their spouses and their children, or had an extended family. The availability of the parents or other adults in the family for the child undergoing physical therapy is an important factor in the success of a family-centered intervention.

The mean scores on the MPOC-20 domains were lower than those reported by O'Neil et al.[2] High scores were obtained for *Comprehensive and Coordinated Care*, followed by *Enabling Partnership* and *Respectful and Supportive Care*. In spite of their not being involved in planning the interventions, the parents perceived that their children received family-centered early intervention physical therapy services to the greatest level in these three areas.

The authors' findings also suggest the need for physical therapists and the organization to give written information constantly to parents based on the low scores for the MPOC domain on *Providing Information.* The parents felt that they needed more information regarding the therapy and condition of their child. Written information regarding the progress and treatment plan for the child will help them monitor their child's needs. This finding is consistent with those of O'Neil, et al.[2] and Raghavendra, et al.[3]

In analyzing the correlation between the parents' profile and their perception of early intervention physical therapy services, most of the parents' profile variables did correlate with early intervention physical therapy services except for *occupation* with *Providing Information* which showed moderate correlation. This implies that parents in the study receive the services regardless of their education background, financial status, number of children, family type and residential status.

Parents who had an occupation received better early intervention physical therapy services related to *Enabling Partnership*, *Comprehensive and Coordinated Care* and *Respectful and Supportive Care*, but only to a small extent. The level of education of the parents did not significantly affect the behaviors of their physical therapists towards them during early intervention. This finding is in contrast with the results of the study of Bailey, et al.[4] on first experiences with early intervention in which level of education of parents and caregivers showed a linear relationship to the quality of experience entering early intervention. The financial status of the parents did not show significant relationship with the extent of physical therapy services during early intervention. This finding is different from that of Bailey, et al.[4] which revealed that families with low household income level received more negative experiences during early intervention. The type of community also had no significant relationship with *Providing*

Information, *Enabling Partnership*, *Respectful and Supportive Care*, and *Comprehensive and Coordinated Care,* in contrast to the study of Raghavendra, et al.[3]

In summary, this present study showed that children with disabilities and who were undergoing rehabilitation generally received a family-centered early intervention physical therapy service. The parents felt that the physical therapy care that their children received was holistic, continuous and consistent over time, settings and people. However, there was insufficient information provided to them by the physical therapists and the organization that provided the service. This points to a deficiency in the relationship between the parents and the rehabilitation service providers. As a whole, parents' profile had no significant relationship with the level of early intervention physical therapy services as to their perceptions. This is a favorable indication that their socioeconomic status does not affect the services that the children receive.

Based on these findings, there is a need for a standardized program in pediatric rehabilitation during early intervention which will promote family-centered care. In a way, incorporating family-centered approach of pediatric care in the curriculum of physical therapy program will help prepare the students in their future role as professionals in the field of early intervention. Physical therapists are encouraged to enhance their management strategies for pediatric patients. This includes providing written information to the parents about the therapy of their child, its progress and results of assessments. Planning together with the parents is also encouraged. Asking them about their goals, interests and priorities about their child and increasing their role in the program will make them feel that they are the experts of their child.

Rehabilitation centers are also encouraged to disseminate information to parents on the types of services they offer, provide booklets, kits or videos, give opportunities for the entire family to obtain information about the disability of their child, and provide advice on how to get information or to contact parents' organization. Providing information should be independent from the occupation status of a parent. Physical therapists are encouraged to provide equal amount of care as to giving information to the parents of children with disabilities.

A larger sample size is also recommended to obtain more precise results. Children with physical disability who are receiving early intervention physical therapy services for less than a year can be included in future studies to increase the sample size. Future researchers are advised to conduct a qualitative study on the experiences of parents during early intervention program. This will further reveal specific sentiments of the parents about the physical therapy of their child. In addition, a study which will include direct observation of physical therapists' behaviors during early intervention is recommended. A study which will compare the outcomes of a family-centered physical therapy with a patient-centered physical therapy during early intervention will also be useful.

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The effect of aerobic exercise on the cognitive ability of physical therapy students*

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Abstract

Introduction Exercise maintains or enhances physical fitness and overall health and wellness. The purpose of this study was to determine if cognitive ability could be improved with regular aerobic exercise.

Methods This experimental study was conducted among first year Physical Therapy students at UERMMMCI. Students who had low levels of physical activity or none at all based on a questionnaire, who passed a medical check-up and were willing to participate were included. Twelve students were assigned to the aerobic exercise group and 11 students to the control group. The exercise group underwent 30-minute sessions of tae bo three times a week for six weeks. Cognitive ability was measured before and after the six week study period in both groups using a Raven's Standard Progressive Matrices evaluation. The test scores were compared using paired and independent T-test.

Results Twelve students in the tae bo group and 11 in the control group completed the study. There was a significant increase in the mean Raven's scores in the tae bo group after the 18 sessions while a decrease was noted in the mean post-test scores of the control group. The mean Raven's scores were significantly higher in the tae bo group compared with those of the control group. The men in the tae bo group had higher scores than the women.

Conclusion Aerobic exercise was effective in increasing the cognitive ability of first year Physical Therapy students. Gender may be a factor in cognitive ability.

Key words: aerobic exercise, cognitive ability

The brain and body are integral components of any individual and both should be in a homeostatic condition in order to function well. Exercise is an integral part of human development. It enhances or maintains physical fitness and overall health and wellness. Exercising three times week for 30 minutes per session is enough to improve health. This is the parameter used in the Shortened Questionnaire to Assess Health (SQUASH).[1]

Stroth, Hille, Spitzer and Reinhardt[2] showed that young adults who adopted an exercise regimen consisting of 30 minute sessions three times a week demonstrated improvement in verbal memory, concentration performance and affect. Physiologically, physical activity such as aerobic workout increases blood circulation, body temperature and heart rate; these changes stimulate an increase in brain activity. Those changes were associated with reduction of stress, increased sensory sharpness and improved concentration.

The relationship of physical well-being to mental activity is seen in various studies. A study on preadolescents revealed that active students demonstrated increased responsiveness and better academic performance than the resting group.[3] Grade school students at a sports camp had better memory performance following an aerobic fitness program.[4] Masley found that subjects who exercised 5-7 times a week had better cognitive function than those who exercised less.[5]

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Total awareness excellent body obedience (Tae-bo) is a form of aerobic exercise which incorporates both speed and agility, combining the moves of tae kwon do, karate, boxing, ballet and hip-hop dancing, developed by Billy Banks during the 1980's. The Korean word "tae" means foot and leg. Tae Bo involves a series of kicks, leg raises and pivots set to fast-paced music to liven up the routine, making it almost dance-like. Front kicks, sidekicks and back kicks are the foundation of the Tae Bo workout. "Bo" is a shortened word for "box" that Billy Blanks created. The use of punches and arm movements builds upper body strength and flexibility.

Raven's Standard Progressive Matrices from Pearson Talent Assessment is a global non-verbal measure of general mental ability. It helps identify individuals with advanced observation and clear thinking skills and can handle the complexity and ambiguity of the modern workplace. Raven's system offers information about an individual's capacity for analyzing and solving problems from complex information, abstract reasoning and the ability to learn. Because it adopts a non-verbal approach, the test is not influenced by language differences. It consists of a series of diagrams or designs with a missing part. The respondent is tasked to select the correct part to complete the designs from a number of options printed beneath.

The purpose of this study was to determine if the cognitive ability of first year Physical Therapy students with a low level of physical activity could be improved with regular aerobic exercise.

Methods

This was an experimental study on first year Physical Therapy students in UERMMMCI to determine whether or not regular aerobic exercise would improve their cognitive ability. The study was approved by the Ethics Review Committee of the Medical Center.

The subjects were recruited from first year students enrolled in Physical Therapy. Students whose level of physical activity was low or light, signed an informed consent and waiver, and passed a general check-up performed by a licensed physician, were included in the study. The level of physical activity was determined through a questionnaire based on the Short Questionnaire to Assess Health (SQUASH). The subjects were assigned to either experimental or control group. The experimental group was subjected to aerobic exercises in the form of tae bo 30 minutes three times a week for six weeks, conducted by a certified tae bo instructor. The control group was instructed to continue with their usual activities. Cognitive ability was measured before and after the six-week study period in both tae bo and control groups using Raven's Standard Progressive Matrices (SPM) administered by a psychologist. Raven's SPM is a test for general mental ability consisting of 60 items divided into five groups. Each subject was assigned a code which was written on the questionnaire instead of the subject's name.

Scores from Raven's SPM were encoded and analysed using SPSS Version 17. A paired T-test was done to compare the pre-test and post-post scores of the tae bo and control groups, respectively. An independent T-test was done to compare the pre-test scores of tae bo and control groups, and the post-test scores of both groups.

Results

One hundred thirty-nine first year Physical Therapy students were invited to take part in the study. Based on the evaluation of their level of physical activity, 50 students were eligible but only 36 students signed the waiver and informed consent. After the medical check-up, 24 students were cleared to take part in the exercise program. Thirteen students agreed to undergo 6 weeks of aerobic exercise and 11 students were assigned to the control group. One student in the tae bo group dropped out leaving 23 participants.

Table 1 shows that the aerobic exercise and control groups are comparable in terms of age and sex.

Table 1. Demographic characteristics of participants.

Variable	Experimental (n =12)	Control (n =11)
Age (years)	17 ± 1.5	16.7 ± 1
Gender	Mean/Percentage	Mean/Percentage
Male	6 (50%)	6 (55%)
Female	6 (50%)	5 (45%)

Table 2 shows a decrease in the mean Raven SPM post-test scores in the control group. Table 3 shows an increase in the mean post-test scores of the tae bo group which is statistically different from the mean pre-test score.

Table 4 shows that the difference between the mean pre-test scores of the control and tae bo groups was not significant. Table 5 shows that the mean post-test score of the tae bo group is significantly higher than that of the control group. The men in the tae bo group had higher mean post-test scores than the women (88.3 vs 85.0) but the difference was not significant.

Table 2. Raven's standard progressive matrices pre-test and post-test scores in the control group.

	Pre-test	Post-test
Mean	79.091	73.636
Std Dev	16.096	17.189
P Value	0.160	0.160

*P value > 0.05 was assessed using Paired t-test

Table 3. Raven's standard progressive matrices pre-test and post-test scores in the experimental group.

	Pre-test	Post-test
Mean	65.000	86.667
Std Dev	±16.514	±8.876
P Value	0.001	0.001

*P value < 0.05 was assessed using Paired t-test

Table 4. Independent t-test of mean pre-test scores in the control and experimental groups.

	Control	Experimental
Mean	79.091	65.000
Std Dev	±16.096	±16.514
P Value	0.051	0.051

*P value > 0.05 was assessed using Independent t-test

Table 5. Independent t-test of mean post-test scores control and experimental groups.

	Control	Experimental
Mean	73.636	86.667
Std Dev	±17.189	±8.876
P Value	0.031	0.031

*P value < 0.05 was assessed using Independent t-test

Discussion

This study showed a significant increase in the cognitive ability of students who underwent aerobic exercise for six weeks, as measured by Raven's SPM, compared to those without exercise. The findings are consistent with the study of Stroth, Hille, Spitzer and Reinhardt. The results also show that the men in the tae bo group performed better than the women in Raven's SPM, indicating that gender maybe a factor in congitive ability. This study was hampered by the limited number of students who were qualified and willing to join. If a future study with a broader bigger sample of students can validate these findings, then it can be recommended that aerobic exercise be offered or made part of the curriculum. A larger sample may have also shown whether or not the apparently better performance of the men is really gender-related.

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The effectiveness of music therapy in the reduction of low back pain due to musculoskeletal disorders*

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Abstract

Introduction This study aimed to compare the effectiveness of classical music therapy as an adjunct in treating patients with low back pain secondary to musculoskeletal disorders.

Methods This randomized controlled trial utilized 30 participants randomly assigned to either experimental group who listened to classical music by Mozart or control group. Both groups underwent the same exercises for 14 days. The pain scores were determined using a Visual Analogue Scale at the start of the study and before and after each session. Levene's test for equality of variances and an independent sample t-test were used to analyze the difference between the means of the music and control groups.

Results The difference of the means of the music and control groups at baseline and during the treatment sessions were not significantly different based on the Levene's test and t-test. The experimental group reported that they felt calm and relaxed, and that the pain seemed more bearable and even lesser in intensity when they listened to music.

Conclusion Classical music therapy may not be an effective adjunct in the treatment of low back pain. This may be due to differences in music taste. The authors recommend exploring or type of music in future studies.

Key words: music therapy, musculoskeletal disorders

Low back pain is one of the most common complaints among patients seeking therapy for musculoskeletal pain. It affects both young adults and older individuals, and may interfere with their quality of life and work performance.[1] Nyland and Grimmer[2] showed that physical therapy students in Australia have a high prevalence of low back pain and the risk increased significantly once they completed first year. Factors associated with low back pain include lack of exercise, health status, type of work, heavy lifting, faulty posture, long hours of sitting, and direct handling of patients. These conditions are present among physical therapists and physical therapy students.

The National Institute for Health and Clinical Excellence (NICE), recommends the following for the treatment and management of low back pain: 1) providing information and education and assessing patient preferences, 2) physical activity and exercise, 3) manual therapy (spinal manipulation, spinal mobilization and massage), 4) acupuncture, 5) combined physical and psychological treatment, 6) pharmacological therapy (Paracetamol, opioids, non-steriodal anti-inflammatory drugs, tricyclic antidepressants), and 7) surgery. Other modalities were considered but not recommended: injection of therapeutic substances into the back, interferential therapy, laser therapy, therapeutic ultrasound, transcutaneous electrical stimulation (TENS), lumbar supports, traction and selective serotonin reuptake inhibitors.

Music is another modality that may be useful in the management of pain. The mechanism is explained by the gate control theory developed by Melzack and Wall in 1965. They postulated that the transmission of noxious stimuli along the pain pathway may be

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altered by stimulating non-pain pathways. Thus, by increasing non-pain sensory input, especially in the auditory, visual and tactile domains, the pain perception can be greatly modified.

McCaffarey and Freeman[3] conducted the first study which used classical music by Mozart as an adjunct to treatment in elderly patients with pain due to with chronic osteoarthritis. The experimental group, which listened to music for 20 minutes daily for two weeks, had a decrease in pain. Guetin, et al.[4] used music as an adjunct to standard physical therapy in treating hospitalized patients with chronic low back pain and was successful in reducing pain. Patients with leg fractures who were provided with music therapy 30-60 minutes daily for three days had less pain and a lower degree of discomfort than patients in the control group in the study of Kwon, Kim and Park.[5]

This study aimed to determine whether the application of classical music as an adjunct during therapy would effectively decrease low back pain due to musculoskeletal disorders. Specifically, the study sought to compare the degree of pain reduction and the mean pain reduction between the music and control groups, and to determine the qualitative effects of classical music in pain relief.

Methods

A randomized controlled single blind trial was conducted on students from the UERMMMCI College of Allied Rehabilitation Sciences to determine the effectiveness music therapy as an adjunct in the treatment of low back pain (LBP) due to musculoskeletal disorders. The study was approved by the Ethics Review Committee.

Participants with low back pain due to musculoskeletal disorders were selected by random sampling from regular BS Physical Therapy students in Level I to Level IV to complete the computed sample size of 15 subjects per group. Those who met the following criteria were considered for inclusion:

1. Diagnosed by a physiatrist with LBP secondary to hamstring tightness, lumbar strain or muscle sprain and scoliosis
2. Pain score of at least 5/10
3. No hearing impairment
4. (+) 90 -90 straight leg raise test or (+) Tripod sign
5. Not currently taking any pain medications

Students with other conditions that may mimic low back pain such as metabolic, autoimmune and infectious diseases were excluded.

The following definitions were adopted for this study: Low Back Pain (LBP) is a pain felt in the lower back that limits a person from doing his tasks or activities. The cause of LBP may be musculoskeletal disorders, trauma or other pathologic conditions. Musculoskeletal Disorders (MSDs) result from bodily reactions to bending, climbing, crawling, reaching, or twisting, overexertion and repetitive movements. Common MSDs are scoliosis, hamstring tightness, osteoarthritis and sciatica. A Visual Analog Scale (VAS) is usually presented as a 100-mm horizontal line on which the patient's pain intensity is represented by a point between the extremes of "no pain at all" and "worst pain imaginable." Classical Music is produced or rooted in the traditions of Western liturgical and secular music. One of the prominent classical musicians is Wolgang Amadeus Mozart, whose selections have 60 to 70 beats per minute. Music with a tempo between 60 and 80 beats per minute is considered relaxing and aids in pain relief.

Two hundred eight potential participants were evaluated by a licensed physiatrist. Those who met the inclusion criteria and were willing to participate were gathered in one room, provided a copy of subject information sheet, and asked to sign an informed consent. They were then asked to rate their baseline pain for using VAS administered by a licensed physical therapist. The participants were randomly assigned into two groups.

The experimental group was made to listen an MP3 music file with a tempo of 60- 80 beats per minute consisting of 1) Andantino from Concerto for Flute, Harp, and Orchestra in C, K.299; 2) Overture A Le nozze di Figaro, @K492; and 3) Sonata Symphonie No. 40, first movement, through earphones via Bluetooth, with a volume of 8, for 20 minutes while performing their therapeutic exercises. The control group performed the therapeutic exercises without listening to music. The management given by the physiatrist for both groups was self-stretching of the hamstring muscle of each leg for 15 seconds, consisting of 5 repetitions with 6 seconds rest in between. The participants were asked to rate their pain before and after each session using the VAS administered by the same physiatrist. The sessions ran for 14 days.

The pain scores were encoded into a computerized database and analyzed using SPSS version 17. An

independent t-test was used to determine the mean difference of the VAS scores of the experimental and control groups.

Results

The 30 subjects consisted of 6 male and 26 female students 16-17 years old. All of them had hamstring tightness and three subjects also had scoliosis. Figure 1 shows that the mean pain scores of the music group were slightly higher than those of the control group starting from the baseline up to the third determination (PS3), but the difference of the means between the two groups was not significant. Levene's test for equality of variances showed no significant difference between the variances of the music and control groups. An independent samples t-test showed no significant difference in the mean pain scores of the music and control groups.

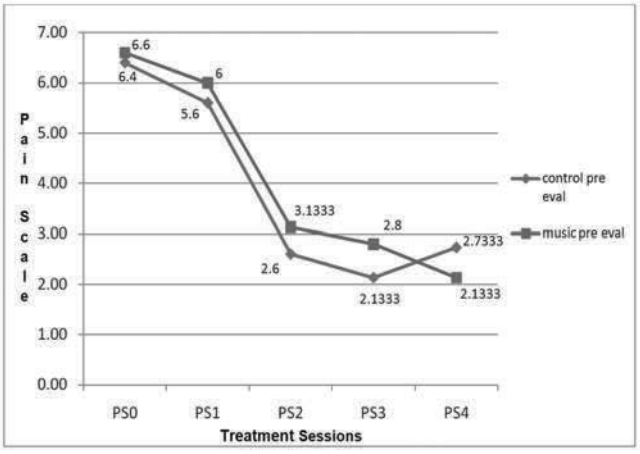

Figure 1. Mean pre-evaluation VAS scores of music and control groups.

Although there is no significant statistical difference in the pain reduction of the control group and the experimental group, the researchers received feedback from the experimental group that when they listened to music they felt calm and relaxed, and that the pain seemed more bearable and even lesser in intensity. However, other participants of the same group reported that the music was not their preferred type.

Discussion

Findings of this are consistent with the study of Smith and Jawed which concluded that the use of classical music in an injection clinic setting did not produce a significant reduction in perceived pain nor improve patient global satisfaction. According to CYRC, Filipino youth are not fond of classical music; this may be a possible explanation for the apparent lack of effect of music in relieving LBP.

The study was hampered by a small sample size for various reasons: lack of interest, poor compliance and conflicts in schedule. The researchers recommend expanding the source population and exploring other types of music, especially those that are suited to the Filipino's current interest and taste, in future studies.

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Selwyn AP, Braunwald E. Ischemic Heart Disease. In: Braunwald E, Isselbacker KJ, Petersdorf RG, editors. Harrison's Principles of Internal Medicine. New York: McGraw-Hill, 1987: 975-982.

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