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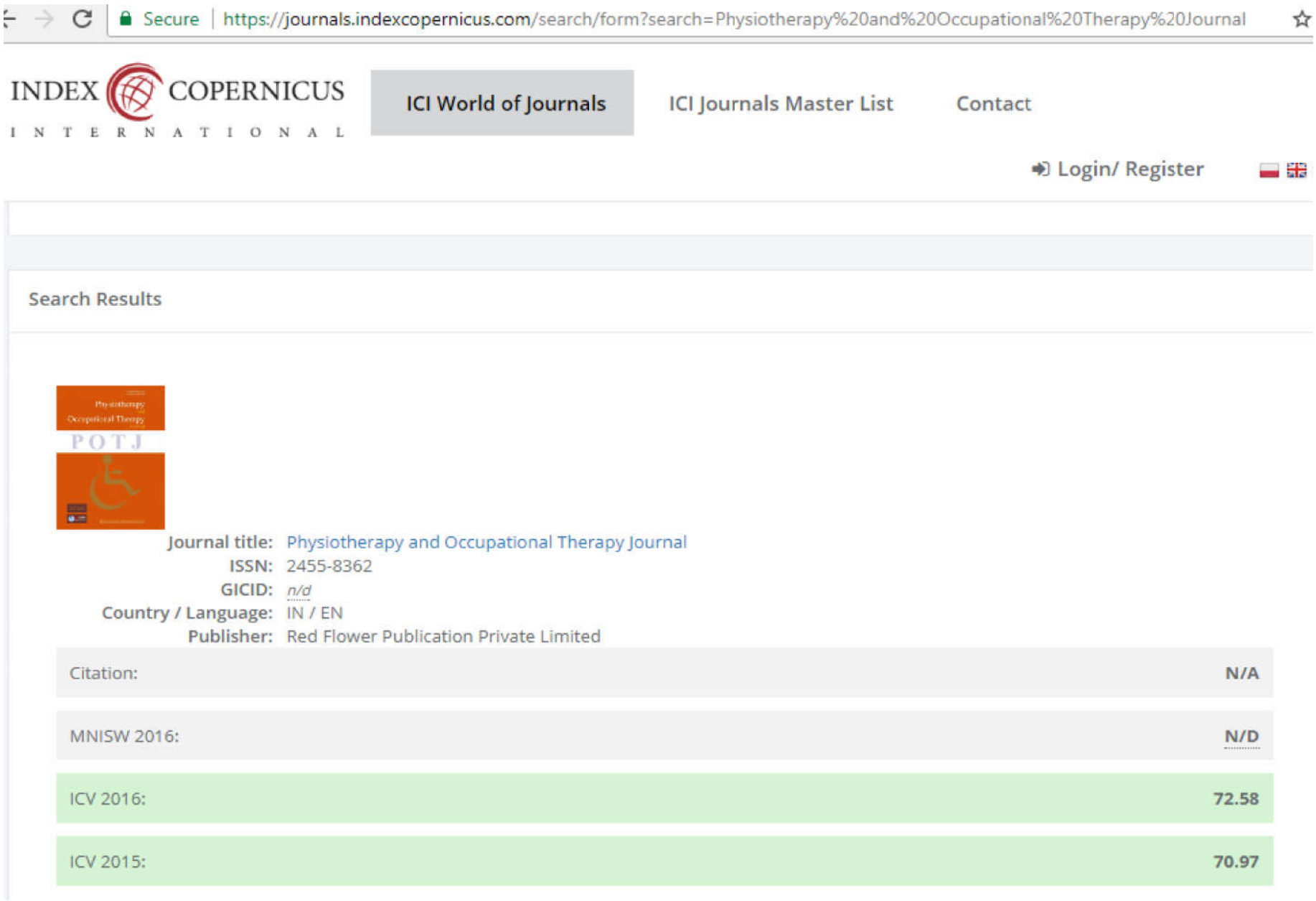
Contents

Original Articles

Review Articles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Original Article

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Comparison of Functional Capacity in Moderate and Severe COPD Subjects

Swati Kala[1], Ravinder Narwal[2]

Abstract

Introduction: COPD is the respiratory disease that affects almost 24 million people and this prevalence is about to increase 32 billion till 2020 in India. It is the disease causing disability and is the fourth leading cause of death in India affecting mostly men, but 40% are women in India. The prime cause is smoking and rest is pollution. It is a slowly developing disease with the main feature of dyspnea and cough with or without expectoration, which can be treated with Breathing exercises. So, this study is designed for a better protocol, which can help patients of COPD reliving dyspnea and other features of COPD, improving their health quality. *Methodology:* A sample of 30 COPD patients was taken on the basis of their symptoms of dyspnea and other features. 15 patients were grouped under Dyspnea Reliving Position (DRP) on the basis of their resting dyspnea. The other group was of rest 15 patients, having no resting dyspnea, were grouped under Paced Walking (PW) group without dyspnea reliving position. Group DRP was taught ACBT (Active Cycle of Breathing technique) in dyspnea reliving position. Group PW was taught ACBT without dyspnea reliving position. Data was collected in the form of outcome variables- SPO_2, BHT (Breath Holding Time), PEFR (Peak Expiratory flow Rate Meter), 6MWT(Minute Walk Test), HR (Heart Rate) and BRPE (Borg Rate of Perceived Exertion) score. ACBT was done 2 times a day for 3 days a week. Data was collected by ANOVA Test and Tukey Kamar's Post Hoc Test as appropriate. *Result:* The total outcome variables were shown to be improved after 4 weeks of pulmonary rehabilitation program. A significant increase in SPO_2, PEFR, 6 MWT distance and Breath holding time was noted in both the groups. A significant decrease in BRPE score and Heart rate was shown in both the groups. *Discussion/Conclusion:* 4 weeks of exercise program showed a significant improvement in the outcome variables of SPO2after ACBT given in both groups of COPD patients, which shows a significant improvement by new protocols of ACBT.

Keywords: COPD; DRP; ACBT; PW; SPO_2; PEFR; 6MWT.

Introduction

Chronic obstructive pulmonary disease (COPD) is the condition of major consideration as it is morbid, with the risk of death of people worldwide suffering from it. COPD or Chronic Obstructive Pulmonary Disease is the disease of the airways that cause decreased function of lungs with dyspnea, cough and sputum production [1]. According to a study in 2011; it is ranked as a fourth leading cause of death. Over 3 million people die from it [2]. Main cause is tobacco smoking with the contributing factors of pollution and to some extent, the genetics [3]. There are various treatments of COPD available. Most common are bronchodilators, oxygen therapy, and other alternatives. These mostly are for reliving symptoms and improve patients Quality of Life [4,5].

Respiratory physiotherapy also plays an important role in the treatment of COPD in reliving it's symptoms as dyspnea and cough with sputum production [6]. Airway mucus hyper secretion is a cardinal feature of COPD. Mucus hyper secretion, implicit in term chronic bronchitis, is one of the disorder order of the lungs in COPD.

The increased mucus is associated with goblet cell hyperplasia and submucosal gland hypertrophy.

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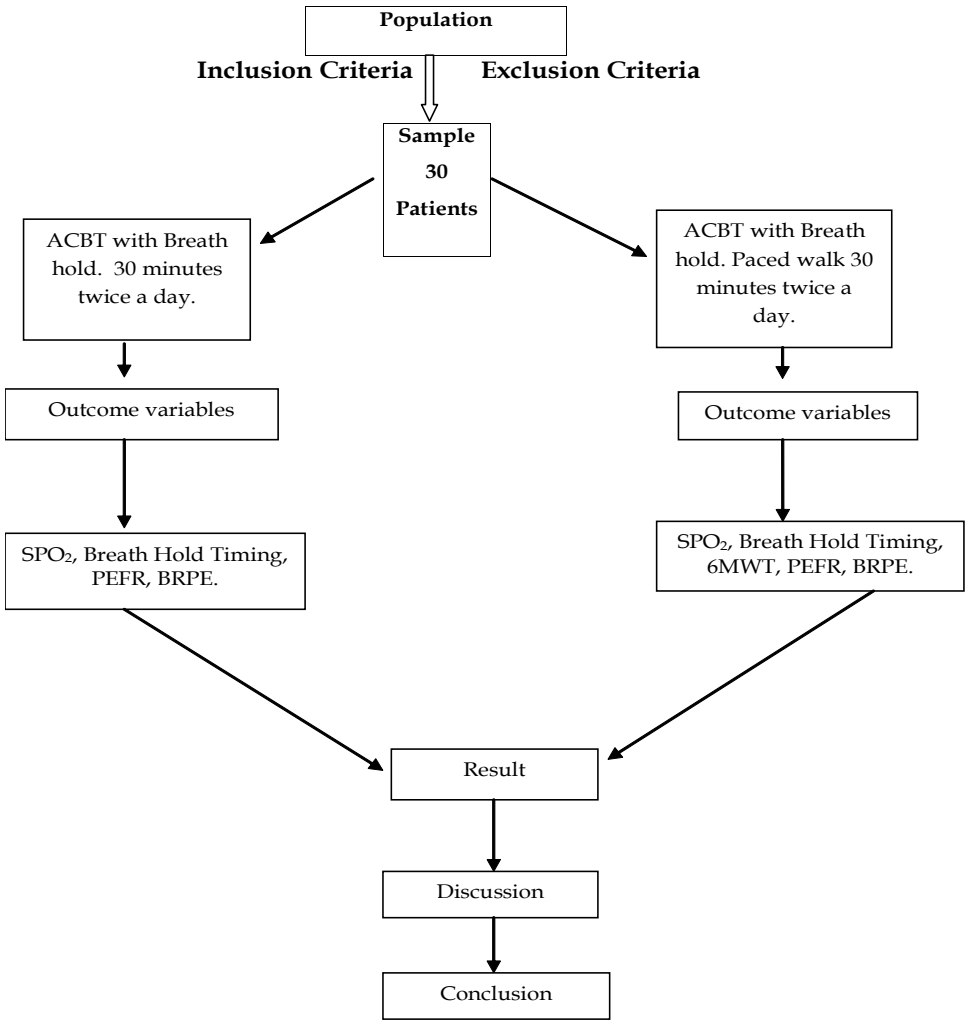
The number of ciliated cells and ciliary length is decreased in patient with chronic bronchitis [7]. These abnormalities coupled with mucus hyper secretions are associated with reduce mucus clearance and airway obstruction. Retained airway secretions can form mucous plugs and bronchial casts that cannot be expelled by coughing. Airway plugging causes impaired ventilation, resulting in lower ventilation – to-perfusion ratios. Increased airway resistance to airflow and air trapping result in hyperinflation of the chest and inspiratory loading of the respiratory muscles, leading to fatigue [8].

Pulmonary rehabilitation programs have been well established in recent years for chronic bronchitis. Pulmonary rehabilitation is given with several goals like to decrease subjective dyspnea, improve Breathing pattern, increase functional endurance, increase strength and endurance of respiratory muscles, improve education regarding disease process, enhance respiratory function and prevent further de-conditioning and improve quality of life [9].

Methodology

In this experimental study, a sample size of 30 patients was taken from the Chest Ward in the HIHT hospital, with the inclusion criteria of COPD and both genders, of the age between 40- 70 years. The patients were divided into two groups, DRP and PW group, containing 15 patients each. The DRP group was taught ACBT in Dyspnea Reliving Position. The PW group was taught ACBT in semi-fowler position. The ACBT was given two times a day in both the groups, one morning and one evening session and each session was of 30 minutes. The functional capacity was then assessed in DRP group with SPO2 levels, PEFR, BHT and BRPE variables. The functional capacity of PW group was assessed with SPO2 levels, PEFR, BHT, BRPE and the 6 MWT distance variables. The data was analyzed using ANOVA test and Tukey Kamar's Post Hoc Test wherever appropriate.



Result of DRP group

SPO_2 Variable

The Comparison of SPO_2 variable of the DRP group having Mean± SD on Day 1 is 90.000±2.070, on Day 2 is 91.667±2.743 and on Day 3 is 93.467±2.642. The F value is 7.199 and P-value is 0.0021 which is very significant.

BHT Variable

The comparison of BHT variable of DRP group with Mean±SD on Day1 is 6.067±2.187, on D2 is 7.067±2.120 and on D3 is 8.600±1.920. The F value is 7.199 and P value is 0.0021which is significant.

PEFR Variable

The comparison of PEFR variable of DRP group with Mean± SD on Day1 is 5.667±1.397, on Day 2 is

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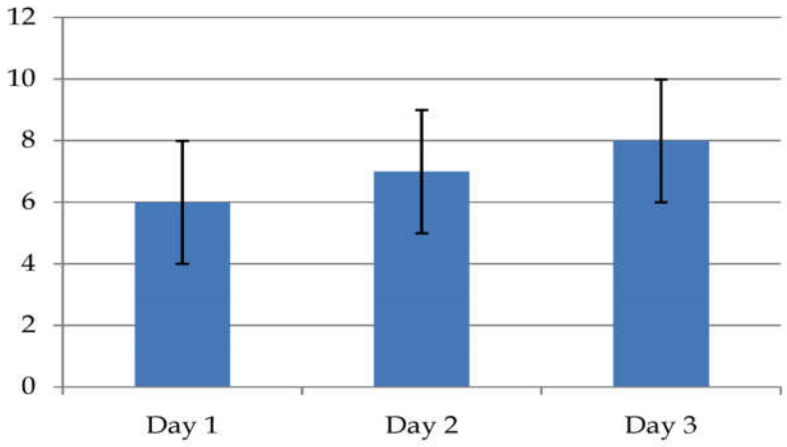

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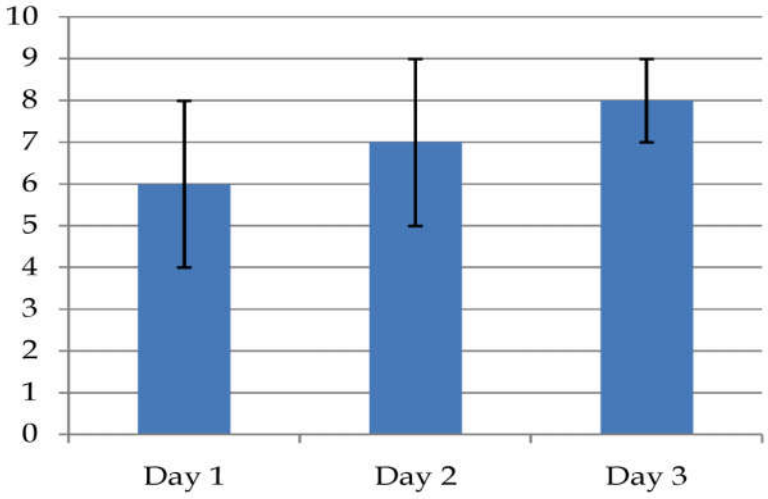

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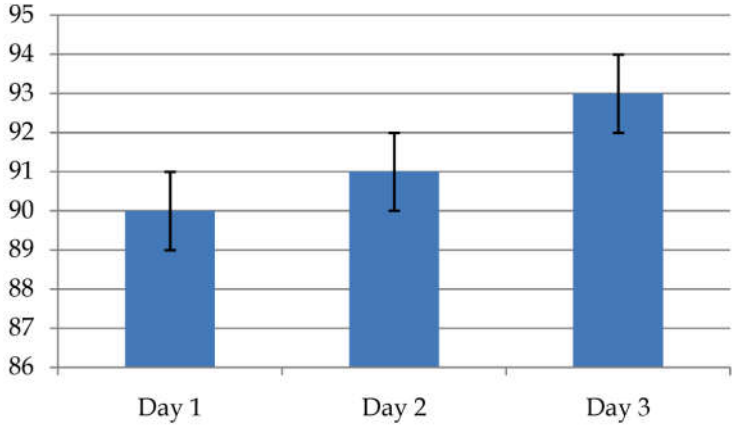


4.000±1.134 and on Day 3 is 2.933±0.9612. The F value is 5.967, and P value is 0.0052, which is significant.

BRPE Variable

The comparison of BRPE variable of DRP group having Mean+ SD, on Day1 is 5.667 ± 1.397, on Day 2 is 4.000 ±1.134 and on Day 3 is 2.933 ±0.9612. The F value is 20.519, and P value is 0.0001 which is significant.

HR Variable

Comparison of HR variable in DRP group having Mean± SD on Day1 is 84.333±3.697, on Day 2 is 81.933± 3.390 and on Day 3 is 78.400±3.225. The F value is 11.272 and the P value is 0.0001, which is considered extremely significant.

Result of PW Group

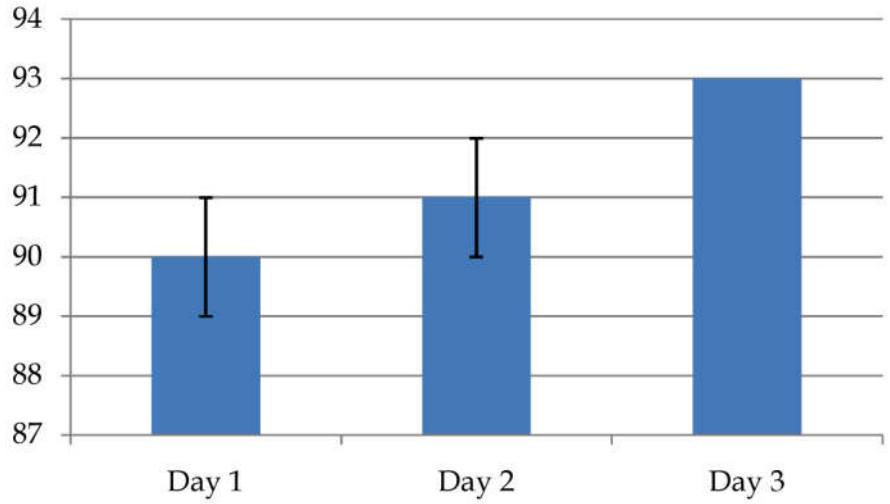
SPO_2 Variable

The comparison of the SPO2 variable of the PW Group with Mean± SD on Day 1is 89.867±3.248, on Day 2 is 89.867 ± 3.248 and on Day 3 is 92.533±3.159. The F value is 3.431, and P-value is 0.0417, which is considered as significant.

Comparison on the basis of SPO2 variable of PW group on Day 1, Day 2 and Day 3.

PEFR variable

The comparison within the group PW on the basis of PEFR variable having Mean± SD on Day 1 is 268.00±62.887, on Day 2 is 291.87±68.547 and on Day 3 is 339.07±75.682. The F value is 4.093 and P-value is 0.0238, which is considered significant.



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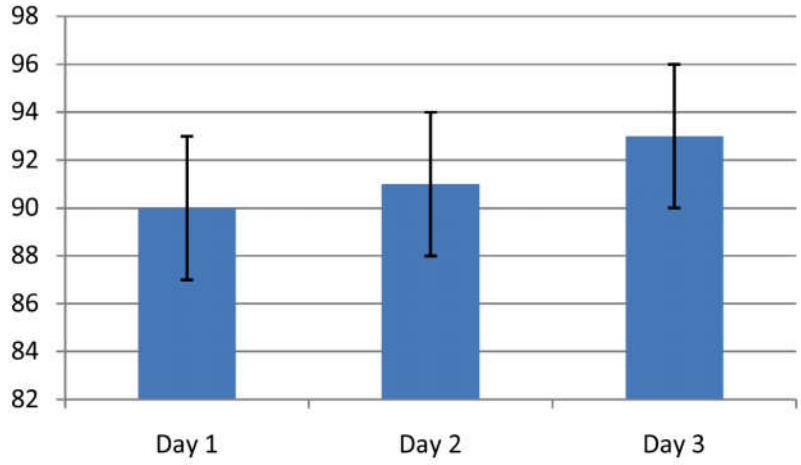


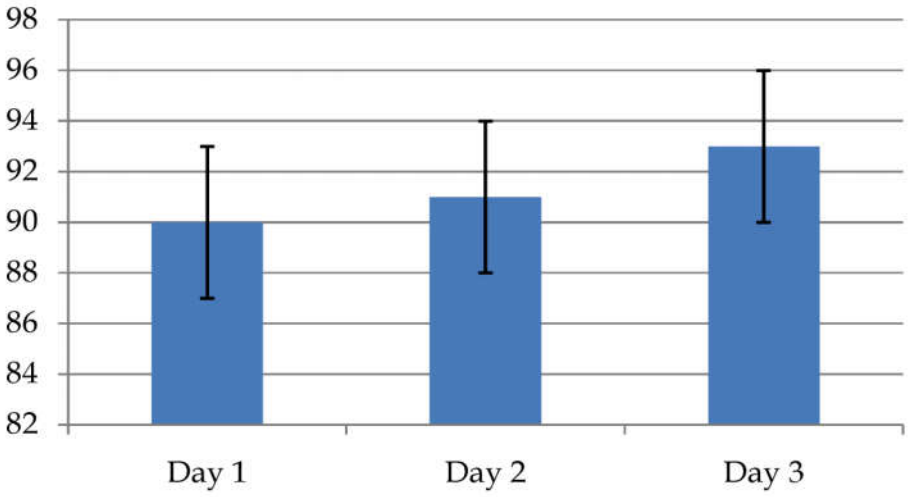
Fig. 5:

Comparison on the basis of PEFR variable of PW group on Day 1, Day 2 and Day 3.

BRPE Variable

The comparison of BRPE variable of PW Group on Day 1 having Mean± SD is 5.867±1.407, on Day 2 is 4.800±1.424 and on Day 3 is 3.033±1.077. The F value is 17.827and P value is 0.0001, which is considered significant.

Comparison of BRPE variable of PW Group on Day 1, Day 2 and Day 3.



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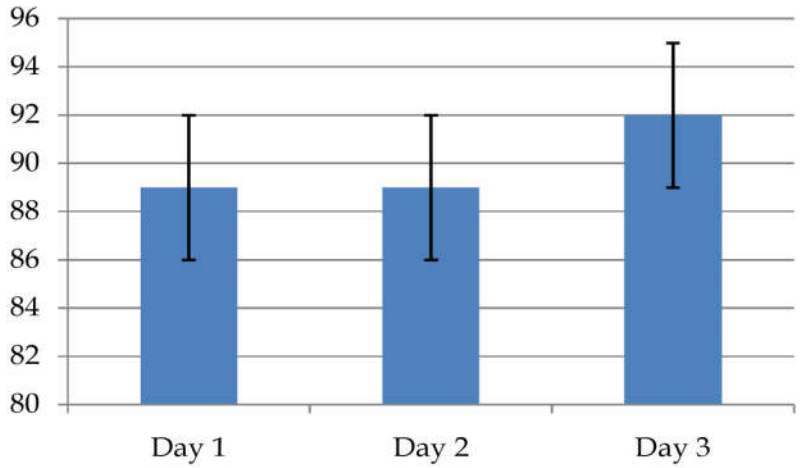

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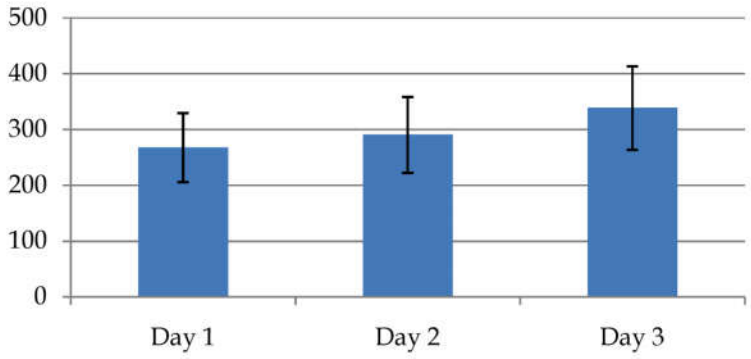

Fig. 8:

Discussion

SPO2 Variable

The result of our study shows a significant increase in SPO2 levels after ACBT, in COPD patients. Tiep and Jones et al. showed that there is improvement in SPO2 level after Breathing execises rehabilitation [10,11]. Breathing exercises in COPD patients improves arterial gas levels significantly. M Vitacca et al, in 1998 showed that diaphragmatic Breathing improves arterial blood gases level [12].

In the variable of Heart Rate, there is significant decrease in Heart Rate from Day 1 to Day 3 in patients by ACBT. Jamal et al. in 2007 showed that there is gradual decrease in Heart rate after 30 minutes of treatment session with ACBT. Neil et al. in 2007 showed that there is increase in heart rate during exercise but it decreases after Breathing exercises [13].

Another finding of our study shows a significant increase in PEFR of the DRP Group after ACBT. Faling et al. in 1993 and Jamal et al. in 2007 showed the difference in lung function tests after pulmonary rehabilitation [14,15].

The next finding of our study shows that there is decrease in BRPE scale of the DRP group after ACBT. Gosselink et al in 1995 and Puhan et al. in 2009 showed that there is decrease in respiratory rate and decrease in dyspnea level of the COPD patients after controlled Breathing exercises. Pulmonary rehabilitation significantly reduced frequent hospitalizations and mortality rate and increased health-related quality of life [16,17].

PW Variable

SPO2

Patterson JE et al. (2004) and Savci S et al. (2000) explained that ACBT proves to be increasing saturation levels in COPD patients [18,19].

PEFR

Savci S, et al in 2000, prove that ACBT is very effective technique in improving PEFR levels in COPD patients [20].

BHT Variable

Breath hold increases the ventilation of the lungs by opening the collateral channels of ventilation. Miller et al in 1995 proved that ACBT improves ventilation of the lungs [21].

Conclusion

The conclusion of our study is that ACBT in Dyspnea Reliving Position is very useful in the patients of COPD and it should be practiced to relieve dyspnea in dyspnea reliving positons. The capacity of the lungs also increased in the patients when trained with Breath hold, as it is very helpful in the opening of collateral channels of ventilation which also helps in patients taking the inhalers. ACBT also increased the lung volumes having a significant effect in lung volume. ACBT in dyspnea reliving positions increase the PEFR and also decrease the HR.

Paced Walk group have significant effect on Breath hold timing which improves SPO2 levels in blood. The PEFR also increase with the increase in controlled Breathing. It shows that controlled Breathing improves Breath hold timing and also the controlled Breathing increases the lung capacity of the COPD patients [22-27].

Limitations and Future of the Study

This study was done on a small sample. This study can be done in large sample to measure the large difference. There can also be another control group for performing the 6MWT without any paced walk. The distance covered then can be measured and then compared with the distance of the Paced Walk group.

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Erratum

Article Titled "**Forward Reach Distance as a Measure of Dynamic Stance Postural Control under Six Different Sensory Conditions in Neurologically Intact Adults: A Descriptive Study**"

S. Karthikbabu*

Baisajhi Das**

Divya Moodbidri**

Shreekanth D. Karnad**

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The original published version of this Article contained errors in the name of second author mentioned, **Baisajhi Das.** But in actual his name is "**Baisakhi Das**"

Now read as,

"Forward Reach Distance as a Measure of Dynamic Stance Postural Control under Six Different Sensory Conditions in Neurologically Intact Adults: A Descriptive Study"

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Mistake is regretted - Editor-in -chief

Original Article

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To Evaluate the Effectiveness of Isometric Exercises in Osteoarthritic Knee Joint

Sanjai Kumar[1], Avikirna Pandey[2], Shweta Bhardwaj[3]

Abstract

Objective: The study was done to find out the effectiveness of isometric exercises in Osteoarthritic knee joints. *Methods*: The study was of experimental design, with 30 subjects (both male and female), The subject diagnosed as osteoarthritis knee by orthopedician who showed a sign and symptoms requested to participate in the study were randomly selected according to the inclusion and exclusion criteria and carried out at Physiotherapy O.P.D. of CSS Hospital, Jai Physiotherapy and Dental Clinic, Ansal Town, Modipuram, Meerut, and Physiocare Clinic and Rehabilitation Centre, Meerut. On day one we have taken pre-assessment of the osteoarthritis knee patients, after that we took range of motion of the knee and evaluated the VAS and WOMAC scale respectively and then we started physiotherapy treatment i.e. hot fomentation with knee isometric exercises. The treatment comprises of 10 minutes hot fomentation followed by exercises for 15 minutes. Subjects were asked to come for physiotherapy treatment for 6 days in a week or 6 weeks. All the analysis were obtained using SPSS version 13.0 (for window 7). Demographic data of the patients including age and gender were summarized. The dependent variable for the stastatical analysis was knee ROM, pain, and WOMAC. A base line data was taken at the beginning of the study (pre test values) and after the completion of the treatment protocol reading was taken for the same parameters (post test values) to analyze the difference , independent t-test was used. A level of 0.05 was used to determine the statistical significance. *Results:* The results showed that there was statistically significant improvement in the ROM and Pain of the knee joint after treatment. The p- value of pre and post VAS and WOMAC was 0.05. So we found, Isometric to be the most effective treatment for knee OA.

Keywords: O.A; Isometrics; VAS and WOMAC.

Introduction

Osteoarthritis is a degenerative condition of joints. It is non inflammatory process. It is characterized by progressive degeneration of new bone ie. Osteophytes. It is more common in weight bearing joint such as hip and knee. Osteoarthritis is one of the most common cause of pain and disability in the western world and it affects up to 80% of people over the age of 65 . Despite numerous research studies, the exact pathways and triggers involved in O.A are still the cause of some debate. O.A is some time known as degenerative joint disease Both men and women are affected but the joint distribution pattern is different [1].

Primary osteoarthritis of knee joint is more common than the secondary osteoarthritis in Indians. It commonly seen in the middle age, obese female however male are not exempted. The symptoms are gradual onset.

Pain is at first intermittent and is provoked by the use of the joint and relieved by rest. The disease progress is characterized by movement in the affected joint being increasingly limited, initially as a result of pain arms muscular spasm, but later because of capsular fibrosis, osteophytes formation and remodeling of bone [3].

Painful cracking and grating on active motion particularly about the patella is an early finding even before roentgenograms become revealing. Quadriceps weakness is even present in very early joint degeneration, suggesting that it may be primary

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risk factor for aspects of knee osteoarthritis. The quadriceps is the prime stabilizer of the knee, affording protection of the articular structure .Muscle strength in older person with knee osteoarthritis may be reduced by up to one third compared with age Extended periods of inactivity caused by the joint pain in arthritis patient can lead to disuse atrophy of the involved musculature and can produce strength declines of up to 3% a week [4].

It is a degenerative joint disease. The etiology is multifactorial still not understood, But commonly it is thought to be wear and tear of joints as one ages. About 80%of people above age of 60 will have symptomatically evidence of osteoarthritic , males and females both are affected. However it is more over the age of 50 particularly in post menopausal age [5].

It is due to friction of patella femoral articulation associated muscle wasting which is an important factor in the progress of the disease, as in the absence of normal muscular control the joint become more prone to injury pain arises from tubercle micro fracture traumatic lesion in the capsule and periarticular tissue and low grade synovitis nocturnal aching may attributed to hyperemia of the subchondral bone [6].

Traditional quadriceps and hamstrings strengthening exercise a isotonic treatment with follow up home exercise program also use full in patient with OA many of the nonmedical, non surgical treatment including superficial and deep heat, cold, exercise, weight loss, acupuncture, Transcutaneous electrical stimulation low energy LASER deep, vibration, topical applied creams pulsed electromagnetic fields a orthotic devices are used to treatment patient with OA [7].

Nonsterodial NSAID' drugs have been mainstay of medical management, all NSAIDS drugs have performed similarly,with patients report approximately 30% reduction in pain and 15% improvement in function. Surgical interventions relives symptoms in some patients but arc expansive and also associated with risk [6].

Statement of Study

Weather the isometric exercise improves range of motion and pain in osteoarthritis of knee patients or not?

Aims and Objectives

To study the effect of isometric exercise on subject with osteoarthritis knee.

Need of Study

Osteoarthritis knee is a common problem in both male and female population. This study is intended to find out an effective treatment for treating osteoarthritis knee.

Hypothesis

Experimental hypothesis: Isometric exercise will have different effect in improvement of range of motion and pain on patient with osteoarthritis of knee.

Null hypothesis: Isometric exercise will have no similar effect in improvement of range of motion and pain on patient with osteoarthritis of knee.

Purpose and Significance of Study

To find out an effective treatment which help in the treatment of osteoarthritis of knee.

To improve functionally in clinical sittings.

Materials and Methods

The purpose and procedure of the study was explained to all the subjects and informed consent was obtained, from those who diagnosed as osteoarthritis knee by orthopedician. Who showed a sign and symptoms were requested to participate in the study and randomly selected according to the inclusion and exclusion criteria and requested to participate in the study, carried out at Physiotherapy O.P.D. of CSSHospital, Jai Physiotherapy and Dental Clinic, Ansal Town, Modipuram, Meerut, and Physiocare Clinic and Rehabilitation Centre, Meerut. On day one we have taken pre-assessment of the osteoarthritis knee patients, after that we took range of motion of the knee and evaluated the VAS and WOMAC scale respectively and then we started physiotherapy treatment i.e. hot fomentation with knee isometric exercises. The treatment comprises of 10 minutes hot fomentation followed by exercises for 15 minutes. Subjects were asked to come for physiotherapy treatment for 6 days in a week or 6 weeks.

Isometric Exercise

Position of patient: Patient in supine lying position with a small towel rolled under knee with knee in 15° of flexion.

Position of therapist: Standing on the affected side of the patient.

Fig. 1: Hot fomentation

Fig. 2: Isometric exercise

Technique: The Patient is asked to press his affected knee on to the rolled towel and hold it for (10-15 sec.) This should be repeated for 20 counts.

Inclusion Criteria

- Age above 35 years
- Presence of sign and symptoms of osteoarthritic knee
- Pain in knee which increases on palpation
- Presence of crepitus
- Osteophytes formation
- Reduced range of motion at knee joint

Exclusion Criteria

Age below 35 years.

Injury around knee joint (ACL and PCL or SOFT Tissue Injury).

Fracture in and around knee joint.

Instruments and Tools Used in the Study

Couch for examination and treatment of the patients.

Universal Goniometer (Half circle): for measuring ROM of joint.

Pillow: For positioning the patient.

Pen and paper.

Assessment Tool

Goniometer: The range of motion measurement is taken with universal Goniometer for joints of extremities, which generally have good to excellent reliability. The accurate application of knowledge and skill, combined with interpreting the results as measurement of range of motion only, provide sufficient evidence to ensure content validity. Active flexion and extension were measured with patient in sitting position [9].

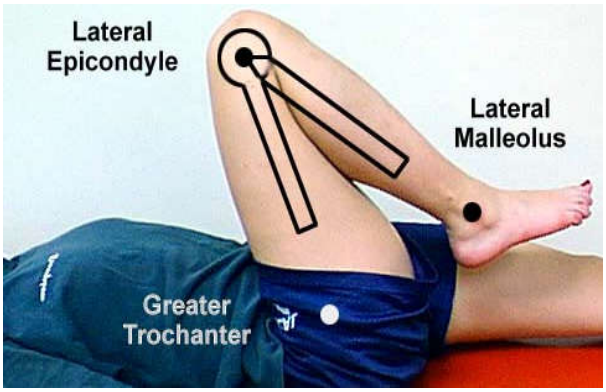

Fig. 3: Goniometer

VAS Scale: Visual analogue scale is a straight line, the ends of which are the extreme limits of the sensation can be measured. The intensity of the pain is measured/rating on the position of the patient's, and is expressed in terms of a fraction of the whole line i.e. 10 cm. Patients of all groups were assessed for following parameters before starting the range of motion using half circle goniometer [10].

Operational Definition

Osteoarthritis

Osteoarthritis is a non inflammatory degenerative disorder of joints characterized by progressive deterioration of the articular cartilage and formation of new bone (osteophytes).It is primary when the etiology is unknown and secondary when it follows some known cause- e.g Trauma, infection, rheumatoid arthritis etc. It is more common in weight bearing joints such as hip and knee. The concept of "wear" and "tear" is generally attributed as a cause of osteoarthritis [11].

Isomctric Exercise

Isometric exercises is a form of exercise that occurs when a muscle contracts without an appreciable change in the length of the muscle or without visible joint motion .Although there is no physical work done, a great amount of tension and torque output are produce by the muscle. Various forms of isometric exercise include muscle setting exercise, resisted isometric exercises, and stabilization exercises. Isometric resistance training improves muscle strength only at the joint angle at which the training takes place [12,13].

Visual Analog Scale

Attempt to represent measurements quantities in terms of a straight line placed vertically or horizontally on paper. The end points of the line are labeled with descriptive or numeric terms to anchor the extremes of the scale and provide the frame of reference of any point in the continuum between them. The patient is asked to bisect the line at a point representing assessed position on the scale. The patient score is thus obtained by measuring from zero to mark bisecting the line [14].

Table 1: Mean and SD of age pre and post vas and WOMAC

	AGE	PRE VAS	POST VAS	DIFF	KNEE FLEX PRE ROM	KNEE FLEX POST ROM	PRE WOMAC	POST WOMAC
MEAN	54.30	8.20	1.33	6.87	117.60	132.27	79.07	33.13
SD	9.07	0.76	0.96	1.04	11.61	8.27	7.18	4.33
MIN	40.00	7.00	0.00	5.00	96.00	120.00	68.00	24.00
MAX	68.00	9.00	3.00	9.00	138.00	142.00	92.00	41.00

Table 2: Frequency and percent of gender

Gender	Frequency	Percent
1.00	10	33.3
2.00	20	66.7
Total	30	100.0

Table 3: Mean and STD dev and STD error mean

	Mean	Std. Deviation	Std. Error Mean
Pre Vas	8.2	0.8	0.1
Post Vas	1.3	1.0	0.2
Knee Flex Pre Rom	117.6	11.6	2.1
Knee Flex Post Rom	132.3	8.3	1.5
Pre WOMAC	79.1	7.2	1.3
Post WOMAC	33.1	4.3	0.8

**. Correlation is significant at the 0.01 level (2-tailed).

Table 4: R and p – value of pre and post vas and womac

		PRE WOMAC	POST WOMAC	PRE VAS	POST VAS
PRE WOMAC	r- value	1	.537**	-.160	-.139
	p-value		.002	.397	.465
POST WOMAC	r- value	.537**	1	.159	-.136
	p-value	.002		.401	.475
PRE VAS	r- value	-.160	.159	1	.283
	p-value	.397	.401		.129
POST VAS	r- value	-.139	-.136	.283	1
	p-value	.465	.475	.129	

**. Correlation is significant at the 0.01 level (2-tailed).

Table 5: Sample corelation

	N	Correlation	Sig.
Pre Vas & Post Vas	30	.283	.129
Knee Flex Pre Rom & Knee Flex Post Rom	30	.946	.000
Pre WOMAC & Post WOMAC	30	.537	.002

Table 6: Paired difference

	Paired Differences					t	DF	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pre Vas - Post Vas	6.867	1.042	0.190	6.478	7.256	36.106	29	.000
Knee Flex Pre Rom - Knee Flex Post Rom	-14.667	4.649	0.849	-16.402	-12.931	-17.281	29	.000
Pre WOMAC - Post WOMAC	45.933	6.074	1.109	43.665	48.201	41.421	29	.000

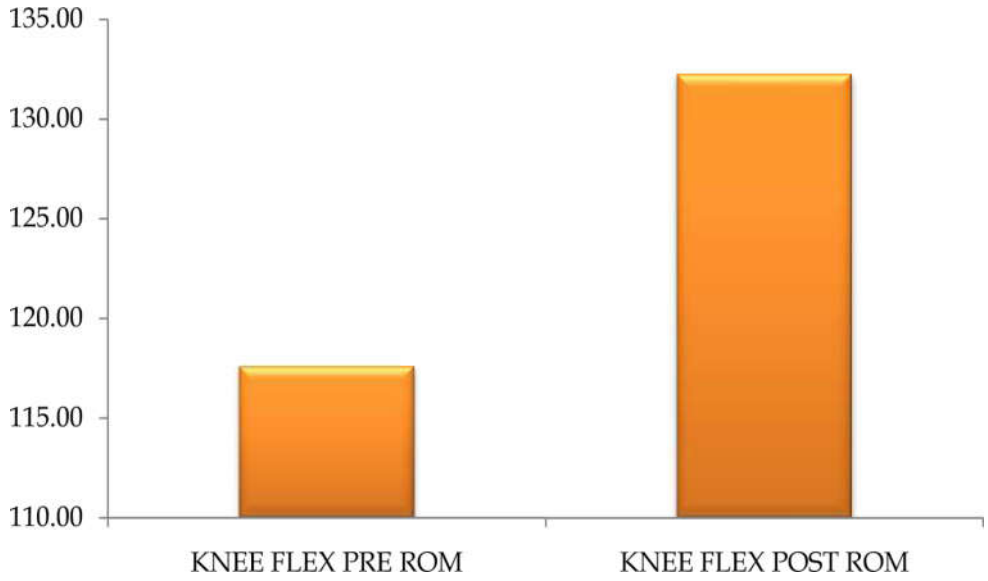

Fig. 4: Knee flex pre and post rom

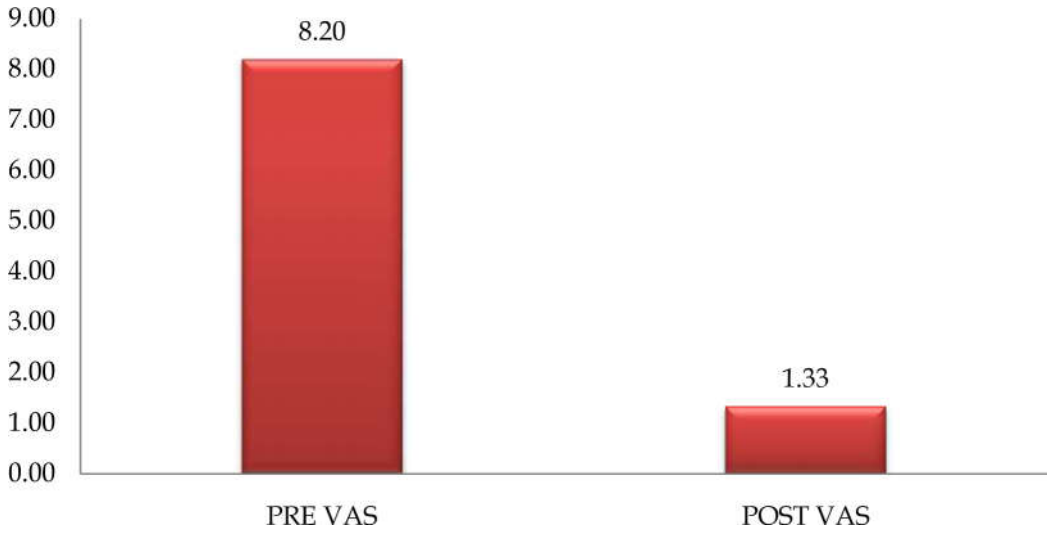

Fig. 5: Pre and post vas

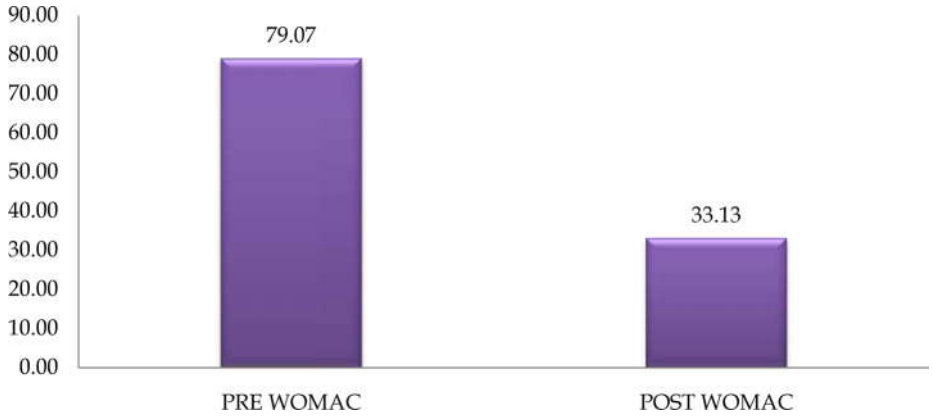

Fig. 6: Pre and post womac

Womac Index

It is used to assess patients with osteoarthritis of the hip of the knee or knee using 24 parameter . It can be used to monitor the course of the disease [15].

Data Analysis

All the analysis were obtained using SPSS version 13.0 (for window 7). Demographic data of the patients including age and gender were summarized. The dependent variable for the stastatical analysis was knee ROM, pain, and WOMAC. A base line data was taken at the beginning of the study (pie test values) and after the completion of the treatment protocol reading was taken for the same parameters (post test values) to analyze the difference , independent t-test was used. A level of 0.05 was used to determine the statistical significance.

The mean age of 53.87 with the standard deviation of 10.00. In this study isometric exercise applied in patient with OA knee. As an outcome pain. ROM and WOMAC were taken. In isometric exercise technique group with p =0.05 pain has improved.

A total number 50 patient was screened for the application technique From which 20 subjects was withdrawal from the study due to some personal reason. So effect of isometric quadriceps muscles strengthening exercise on osteoarthritis of the knee was included in the study after the examination and analysis inclusion and exclusion criteria. The subjects was taken subharti hospital. In the study both female and male was there but, the ratio between them is not equal. The female was more in number than male.

Md. A. Shakoor et al. found significant improvement muscle strengthening exercise is found to have better effect when it is used in adjunct to NSAIDS in osteoarthritis knee joint. Exercise may decrease the need of NSAIDS and thereby side effects of NSAIDS can he avoided.

The data analysis was done by using the software SPSS version 15. In which the test used was paired T-test. There was comparison between pre evaluations of the same group with the post evaluation of the same group. The study shows that there is statistically significant improvement on the knee joint after treatment. The mean value of pre and post vas 0.005 and WOMAC 0.05 and p value is 0.0.5(normal pm000) and the mean value of pre and post.

We consider our positive results Isometric was helped by our setting in general practice and adequate selection of patients by diagnostic groups. We found Isometric to be the most effective treatment for knee OA. So on summary we conclude through the improvement shows that the technique has a differential outcome Isometric provide better result.

Limitation of Study

The study was done on a very small sample.

The study is a short time study.

The study is done on a limited part of the body.

Suggestion for further study (future research):

Effectiveness of ultrasound with isometric exercise and deep friction massage can be tried in various other muscle groups .

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Erratum

Article Titled "**Alarming Rate of Maternal Obesity during Pregnancy: Refitting by Exercise**"

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The original published version of this Article contained errors in name of authors mentioned. Third author name is to be added as **Anuradha Lehri.**

Now read as,

Alarming Rate of Maternal Obesity during Pregnancy: Refitting by Exercise

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Original Article

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Prevalence of Musculoskeletal Pain among Half Marathon Runners and Full Marathon Runners: A Survey

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Abstract

Background: As awareness of exercises is widely promoted in public, running has become a popular physical activity. Hence, there are increased numbers of marathon event yearly in Malaysia. Consequently, running related injuries have become common. *Objectives:* To identify the prevalence and common location of running related musculoskeletal pain among the half marathon runners (21km) and full marathon runners (42km) in Malaysiaand to identify which type of runners (half marathon runners or full marathon runners) had higher prevalence of musculoskeletal pain. *Definition of Musculoskeletal Pain:* any pain in body, included muscle and joint, which caused a restriction of running or training for at least 1 day. *Design:* Cross sectional survey. *Methods:* A total of 100 half and full marathon runners from JB and KL marathon event were participated in this study. The self-reported questionnaire was used in this study and runners were asked to complete the questionnaire, which included demographic data, training characteristic, pain assessment, diagnosis and previous injury. *Results:* The prevalence of musculoskeletal pain was 52%. The knee (28%) and lower leg (28%) was frequent reported pain area. Data showed there is no significant difference for prevalence of musculoskeletal pain in between half marathon runners and full marathon runners (p= 0.261). *Conclusion:* The prevalence of musculoskeletal pain among half and full marathon runners were substantially high.80.8% of the runners were ignored the pain. Therefore, physiotherapists are important in implementing the prevention, awareness and interventions strategies in order to avoid worsening of injuries.

Keywords: Marathon Runners; Running Pain; Overuse Injury Prevalence.

Introduction

As awareness of exercises is widely promoted in public, more and more people are more likely to involve in one or two physical activities. Running is one of the most popular activities. It is not only because of low cost, but also because of ease of implementation and the health benefits. Running can decrease the risk of cardiovascular disease,diabetes mellitus, and depression. It also can improve bone density, decrease mortality and help in weight control (Cymet & Sinkov, 2006). According to a study from Standford University School of Medicine, which has tracked 500 olders runners for more than 20 years suggested that regular running slows the effect of aging (Digitale, 2016). Evidences also showed that endurance sport could increased the life expentancy (Burkule, 2016). It caused a greater lean body mass and slowed the progression of cardiovascular disease associated with cancer, infections and neurological disease. Lee et al have done an obsevational cohort study andsuggested that running with minimum 5 to 10 min per day and at a slow speeds <6 miles/h could markedly reduced risks of death from all causes and cardiovascular disease (Lee et al., 2014). Hence, running could reduce the risk of cardiovascular disease.

In Malaysia, there have increase number of marathon in different state each year since there is increased number of participants. There are up to 32 races for half marathon this year and 15 races for full marathon, which included Penang Bridge International Marathon, Standard Chartered KL marathon, ATA Marathon, Iskandar Puteri Night Marathon and others ("Running Events Calendar

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Malaysia", 2017). However, there are some risks for running, musculoskeletal pain in runners are common, which present with incidences rate from 18.2% to 92.4% and prevalence rates is between 6.8 to 59 injuries per 1000 hours of running, depend on the target population and definition used (Lopes, Hespanhol, Yeung & Costa, 2012; Roos, Taube, Zuest, Clénin& Wyss, 2015). Although there was no standard definition for running injuries, in this study, the definition for RRI is same as Buist's study which defined as any musculoskeletal pain in the body included muscle and joints, which caused a restriction of running for at least 1 day (Buist et al., 2008). 80% of the running injuries are overuse injuries, which is more likely to occur in long distance runners due to the distance and time exposure to running (Taunton, 2003). Van Mechelen also reported that there were 2.5-12.1 injuries per 1000 hours of running in recreational and competing runners (van Mechelen, 1992). The competitive and elite athletes tend to have fewer running related injuries per 1000 hours of exposure compared to recreational or inexperienced runners (Roos, Taube, Zuest, Clénin& Wyss, 2015). Although there are a lot of running related injury study been done, there is less study about prevalence of musculoskeletal pain been done in Malaysia. Therefore, it is important to assess the prevalence of running related musculoskeletal pain and associated risk among runners in Malaysia before a race in order to plan an effective prevention strategies and intervention.

The Objectives of this Study are:

1. To determinethe prevalence and common body location of running related musculoskeletal pain among the half marathon runners and full marathon runners in Malaysia.
2. To determine the type of runners having higher prevalence of musculoskeletal pain.

Methodology

Participants

In this study, a cross sectional survey was conducted through purposive sampling technique to identify the prevalence of musculoskeletal pain among half and full marathon runners and which type of runners having more presence of musculoskeletal pain. The consent email for conducted the survey in selected recreational marathon events at Johor Bharu (JB) and Kuala Lumpur (KL) was sent before the event day. These events were chosen through online marathon calendar within March and April 2017. These two cities were selected because of JB is the second largest cities in Malaysia; while, KL is the biggest city in Malaysia and it is the center of country("Cities and towns in Malaysia | Wonderful Malaysia", 2017).

The questionnaireswere distributed to the half and full marathon runners. Detailed explanation was given to subjects and informed consent was obtained from the runners' prior the data collection. Subjects were free to ask the questions if they are not understanding the questions in the questionnaire during first reading.

This study was approved by INTI International University Board of Ethics Committee. The half and full marathon runners with at least 2 years of running experiences, had participated at least 2 marathon event under same categories (half or full marathon), completion of at least 1 marathon in past 12 months, age between 18 to 65 years old and able to understand English were included in this study. However, those runners who does not run in any full or half marathon in past 12 months or stop running for more than 1 year and those recreational runners who run for 5km and 10km were not included in this study.

A total of 108 runners who agreed to take the survey, however, 8 runners were not met the criteria (n=3: not participate in any marathon in past 12 months, n=5: have 2 years running experiences but had participated less than 2 times of marathon event in half or full marathon). Hence, total of 100 runners were involved in the final data analyses with a respondent rate of 90%.

Data Collection or Instrument Used

The self-reported questionnaire was used in this study. Questions were developed based on the Lopes' and Hespanhol's study with the permission of authors and been evaluated by the supervisor. The questionnaire has been divided into 5 sections.

The section A included the personal data (gender, age, race, height, weight, and BMI), running experiences, running categories, number of marathon event been participated in past 12 months in order to ensure the subjects met the inclusion criteria. Section B is about the training characteristic which included frequency of training, duration for a training session, predominant training surface and the training distance in a week.

Section C is the pain assessment which used to identify the prevalence of running related musculoskeletal pain among the runners. According

to the International Association for the Study of Pain (IASP), pain can be defined as unpleasant sensory and emotional experience associated with actual or potential tissues damage, or describe in term of such damage. It is always subjective (Merskey & Bogduk, 2012).The subjects who reported current running related musculoskeletal pain were asked to describe the intensity of pain with the visual analog scale (VAS), location of pain with body chart, duration and behavior of pain. According to the reported pain intensity where the runners circle on VAS from 0 to 10, it is further describe with mild (1-2), moderate (3-7) and severe (8-10) (Teixeira, Lunardi, da Silva, Lopes & Carvalho, 2016).

Section D was included the medical diagnosis and treatment done and section E is about the past history of pain or injury particular for past 6 month in order to reduce the recall bias.

Statistical Analysis

Descriptive analysis with Statistical Package for Social Science (SPSS) window version 24 was used to summarize the data. The categorical data which included prevalence of musculoskeletal pain, common location of musculoskeletal pain and pain behavior were describe in percentage and expressed in bar chart and body chart. Independent Samples T-test was used to identify which type of runners (half marathon or full marathon) had more prevalence of musculoskeletal pain with the p value < 0.05. Cross tabulation also been used to identify the prevalence of pain among half and full marathon runners with different variables.

Results

The characteristic of the participantswas presented in Table 1 and Table 2.

Prevalence of Musculoskeletal Pain among Recreational Marathon Runners and Common Location of Pain.

Figure 1 showed the reported pain location by respondent with musculoskeletal pain. 11 individuals reported two distinct of pain and 9 individuals reported of 3 area of musculoskeletal pain.

Prevalence of Musculoskeletal Pain in Between Half Marathon Runners and Full Marathon Runners.

In cross tabulation, result showed 36 out of 64 half marathon runners reported existing of musculoskeletal pain. Whereas, 16 out of 36 of full marathon runners reported presence of pain and 20 of full marathon runners reported no pain (Figure 1). In this study, Independent Sample T-Test was used and result showed that there is no significant difference for prevalence of musculoskeletal pain in between half marathon runners and full marathon runners, p=0.261, which greater than 0.05 (Table 3).

Table 1: Characteristic of Runners

	Numbers (N=100)	Percentage %
Gender		
Male	66	66
female	34	34
Age		
18-19	6	6
20-29	35	35
30-39	31	31
40-49	23	23
50-59	4	4
60-65	1	1
Race		
Malay	36	36
Chinese	56	56
Indian	3	3
Others	5	5
Height		
less than 150cm	8	8
150cm - 159cm	20	20
160cm -169cm	39	39
170cm - 179cm	27	27
more than 180cm	6	6
Weight		
40kg - 49kg	15	15
50kg - 59kg	25	25

60kg - 69kg	37	37
70kg - 79kg	17	17
more than 80kg	6	6
BMI		
Underweight	12	12
Normal	74	74
Overweight	13	13
obese	1	1
Categories		
21km or half marathon	64	64
42km or full marathon	36	36
Running Experiences		
2 years	37	37
3 years	19	19
4 years	21	21
5 years	7	7
more than 5 years	16	16
Training Frequency		
1-2day/week	29	29
3-4day/week	41	41
5-6day/week	10	10
Everyday	1	1
ecific training time, do when free	19	19
Training Duration		
less than 30 min	15	15
30-60min	46	46
1-2hours	33	33
2-3 hours	3	3
more than 3 hours	3	3
Training Distance		
up to 10km	42	42
10-20km	25	25
21-30km	16	16
31-40km	10	10
more than 40km	7	7
TrainingSurface		
asphalt (road surface)	74	74
grass	8	8
clay	3	3

Table 2: Prevalence of musculoskeletal pain which reported by runners according the body area

Pain Location	Anterior
Shoulder	2.4
Hand and Forearm	2.4%
Back	6.1%
Thighs	19.5
Knee	28%
Leg	28%
Foot	13.4%
Back	6.1%

Table 3: Independent Sample T-Test, $p < 0.05$.

		Independent Samples Test								
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	DF	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
pain	**Equal variances assumed**	.017	.896	-1.130	98	.261	-.11806	.10446	-.32536	.08924
	Equal variances not assumed			-1.128	72.194	.263	-.11806	.10469	-.32675	.09064

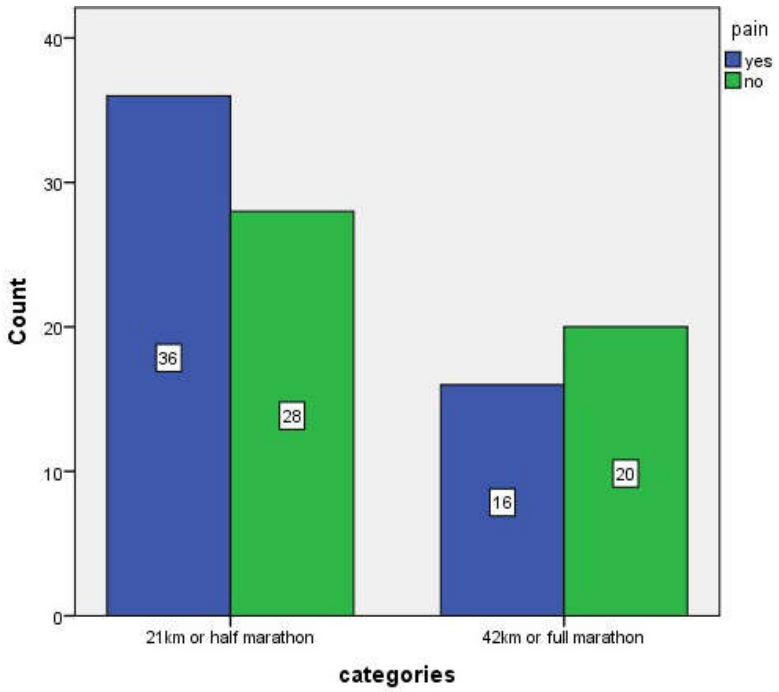

Fig. 1: Cross tabulation for Prevalence of musculoskeletal pain in between half marathon runners and full marathon runners

Discussion

This cross sectional survey was done to identify the prevalence of musculoskeletal pain among the marathon runners and common location of injury. The result showed that the prevalence of musculoskeletal pain among 100 respondents of both half marathon runners and full marathon runners were 52%. The knee (28%) and lower leg (28%) weremost frequent reported pain area. The second objective of this study was to identify which type of marathon runners, either half or full marathon runners have higher prevalence of musculoskeletal pain. Independent Sample T-Test showed that there is no significant difference for prevalence of musculoskeletal pain in between half marathon runners and full marathon runners.

Overuse injuries usually do not cause immediate cessation of participation. However, eventually, it will cause restriction and limitation in participation over the time. Recent studies have mentioned that it is important to described overuse injuries in term of pain and reduce performance as athletes do not recognized the symptoms as an injury (Bahr, 2009; Lopes et al, 2011). The prevalence of musculoskeletal pain among marathon runners in this study were 52%, which revealed that around 1 in 2 runners is compete the race with pain. It means most of the runners are unaware about overuse injuries while still participate the run.

This study showed higher prevalence than other study which done in Brazil, where the prevalence among the recreational runners for 5km and 10km immediately before a race were only 22% (Lopes et al., 2011). It also showed higher than the study which done in an athlete club, Cape Town, where the prevalence of injury among half and full marathon runners were 32% (Hendricks & Philips, 2013). However, it showed lower than the study which done among half marathon runners in South Africa, where the study showed 90% of runners sustained a RRI (Ellapen, Satyendra, Morris & Van Heerden, 2013). It also showed lower prevalence in another study which done among elite marathon runners a week before a race (Teixeira, Lunardi, da Silva, Lopes & Carvalho, 2016). This may be due to the sample size and different study population.

The most frequent reported pain intensity through a VAS from 0 to 10 was moderate pain, followed by mild pain, and none of the respondents reported severe pain before the race, which may suggests overuse or chronic musculoskeletal conditions among the respondents (Lopes et al, 2011). Surprisingly, 80.8% of the runners with pain did not seek help from doctor and only 8% of the runners undergone physiotherapy treatment for their current complaint. 6% of the respondents suggested chronic musculoskeletal conditions, which included knee pain (3%), muscle pain (1%), muscle tightness (1%), and patella tracking (1%). However, 3% of the respondents reported ACL injury and 1% of individual been diagnosed as ankle sprain.

Van der Worp et al found that previous injury increased the risk of lower limb injury in runners, especially for those lower limb injuries in the previous 12 months (Van der Worp et al., 2015). Among 35 individuals with previous injury, 15 individuals reported recurrent injury and the most common site of recurrent injury was knee. The higher incidence of re-injury in runners especially knee problem may be due to incomplete healing from the original injury or uncorrected biomechanics problems (Van der Worp et. al., 2015).

36 out of 64 half marathon runners reported pain at the moment (56.25%) and only 43.75% of half marathon runners reported no existence of pain. In contrast, data showed 16 out of 36 full marathon runners reported presence of pain (44.44%) and 55.55% of full marathon runners reported no presence of musculoskeletal pain. The higher weekly training distance and more years of running experiences among full marathon runners may cause musculoskeletal adaptation and thus less predisposed to develop injuries (Van Middelkoop et al., 2008; Rasmussen et al., 2013;van Poppel, de Koning, Verhagen & Scholten-Peeters, 2015). A study done by van Poppel et al, 2015, also showed that half marathon group had higher incidence of lower limb injuries, where the incidence of injuries was 23.6%. Whereas, the running injuries rate in marathon runners was 22.7% (van Poppel, de Koning, Verhagen & Scholten-Peeters, 2015). However, in this study, Independent Sample T-Test showed that there is no significant difference for prevalence of musculoskeletal pain in between half marathon runners and full marathon runners. Thus, a further study may require in order confirming the findings.

This study had found that 42 out of 67 runners who ran up to 10 km to 20 km weekly had presence of musculoskeletal pain. However, only 1 runner out of 7 individuals who trained more than 40 km weekly reported musculoskeletal pain. Hence, this suggested that increased in training distance were considered to be protective factors against knee injury to marathon runners (Lopes, Hespanhol, Yeung & Costa, 2012). The result in this study also showed consistent with a review done by Lopes et al, 2012, where high weekly training frequency and trained only once a week were more prone to RRI.

Future Direction

This study had provided the baseline information of prevalence of musculoskeletal pain among marathon runners in Malaysia. Hence, the detailed prevention and effective intervention strategies with evidence based are required to implement in order to reduce the incidence rate and prevalence of musculoskeletal pain which caused impairments, dysfunction, and restriction among the runners. Further studies included RCT to test the effectiveness of interventions for RRI should encourage in future in order reducing the disability among runners (Hespanhol Junior, Costa, Carvalho & Lopes, 2012). In addition, due to the design of study, the association between the training characteristic, such as training frequency, training distance, and musculoskeletal pain could not be well established. (Lopes et al., 2011).

Limitations

This study had some limitations, thus, the findings are required to interpret cautiously. As this study used self-reported questionnaire, it may have some recall bias. The sample size in this study was only a small proportion of marathon runners which hardly presented as whole population. It was not possible to identify the causation factor from this study due to the study design was cross sectional design (Mann, 2003).

Conclusion

52% of half and full marathon runners were reported presence of musculoskeletal pain. The most common location of musculoskeletal pain among the runners was knee (28%) and lower leg (28%). The consistent of location for musculoskeletal pain with other international studies suggested that a standard prevention strategies are encouraging among the runners to reduce the prevalence of musculoskeletal pain. Although more number of half marathon runners reported presence of musculoskeletal pain in this study (36 out of 64 respondents reported existence of pain and 20 out of 36 full marathon runners reported no existence of musculoskeletal pain), however, this study showed that there is no significant difference for prevalence of musculoskeletal pain in between half marathon runners and full marathon runners. As 80.8% of the marathon runners were neglected the pain, the awareness and early identification of injuries are important to rise among public and runners in order to prevent worsening of conditions. Therefore, the baseline data of musculoskeletal pain may contribute to the development of educational and preventive strategies (Lopes et al., 2011).

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Review Article

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Call for the Scientific and Peer-Reviewed Publication among Indian Physiotherapists: The Need of the Hour

Asir John Samuel[1], Kanimozhi Narkeesh[2]

Abstract

Publication concept introduced among the Indian physiotherapist just a decade ago. It is still in emerging stage and the importance is still not yet explored by them. Most of American and Australian physiotherapy journals are visualizing more than 90 volumes (90 years of existence). In contrary to, Indian physiotherapy journals have less than 10 volumes. Poor guidance and fake publishers threatens the publication standards of Indian physiotherapy researchers. This short review highlights the importance of publication and step to identify genuine journals by Indian physiotherapists.

Keywords: India; Internet; Journal Impact Factor; Librarians; Peer Review.

Introduction

Physiotherapy researchers are recognized and valued based on their research publications. If there is no research publications produced by a researcher, then it is considered that the researcher has not involved in any research work. Researcher's research work is known to the world only by their scientific publications. Research publications in recognized journals earns them research funding by recognized funding agencies. They are entitled for international travel grant, short term research funding and many more are based on research publication. Unfortunately, most of Indian physiotherapist, physiotherapist students and scholars are unaware about the genuine publishing platform. Their research work is wasted and not known to research community by publishing in fake journals. This short review highlights the importance of publication and step to identify genuine journals by Indian physiotherapists.

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Publishing in Digital Age

In the age of modern communication and fast internet era, identifying research publication and journals was not a cumbersome job anymore. This makes the researcher to publish more in publish or perish era. Researchers are bound by both the pressures to publish and at same time to produce quality researchers [1]. Eventually, they end up in publishing large volume of poor quantity content, which opened the back door and allowed the entry of "predatory journals" produced by "predatory publishers." The word, "Predatory" refers to the concept of preying on academicians for academic and research content for monetary benefit of the publisher [2]. They do not provide single benefit to the scientific community. Even this concept start inflicting the physiotherapy community. The journals which publishes the research with genuine peer-review can be rightly called as, "fake journals"

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since 1975 [3]. Recent years has seen the introduction of Science Citation Index Expanded (SCIE) and Emerging Sources Citation Index (ESCI) to cover most of standard scientific journals under Web of Science core collections.

Consequences and Benefits Publication in Genuine Journals

Publishing in fake journals have devastating consequences for students, researchers, and academic faculty or research scholars. It could ruin their career and tarnish their reputation in India and worldwide, PhD degree of research scholars could be withdrawn if they have shown the publication (minimum one research publication is mandatory by UGC for gaining PhD degree in the concerned PhD topic) published in predatory journals for the said degree, Similarly, the academic faculty could be de-promoted if they have shown predatory publication for their promotion, black listing the author's institutions and finally vanishing of the research content from online platform due to improper digital repository or archives. While, uncountable benefits follows by making research publication in genuine journals. It earns stable academic and research reputation, easier approval of research funding, international travel grant and academic promotion, elevating the Institutional research ranking and overall improving the scientific evidence and literature.

Conclusion

Thus we encourage Indian physiotherapist to adopt the above said suggestion and mind the benefits of making publication in journals with genuine metrics.

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Conflict of Interest

None of the authors have competing interest declared

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Review Article

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Exercise-Induced Childhood Asthma: The Available Guidelines, Mechanism and Hypothesis

Vencita Priyanka Aranha[1], Kanimozhi Narkeesh[2]

Abstract

Childhood asthma (CA) is a growing problem affecting the respiratory health of children. Physical activity (PA) plays a role in the relationship between asthma and respiratory health. Information on factors associated with cardiorespiratory fitness levels among the children with CA is limited. Here we summarize the list of guidelines available for the management of the children with CA and the role of paediatric physiotherapist in assisting children for better living.

Keywords: Asthma; Children; Guidelines; Physical Activity.

Introduction

Childhood asthma (CA) is a heterogeneous disease characterised by chronic airway inflammation. It is defined by the history of respiratory symptoms such as wheeze, shortness of breath, chest tightness and cough that vary over time and in intensity, together with variable respiratory airflow limitation. If the children is left untreated, they may end up have less aerobic and anaerobic capacity when compared to their peers.

Guidelines for the Childhood Asthma

The causative agents responsible for childhood asthma is still not yet understood. Hence, we are idiots and the children with CA are pathetic, So, rightly can be called as an idiopathic disease. At present, there are four famous guidelines available for the management of asthma. They are Guidelines for the Diagnosis and Management of Asthma by the Expert Panel Report 3 (EPR-3) of National Asthma Education and Prevention Programme (NAEPP) Coordinating Committee (CC) coordinated by the National Heart, Lung, and Blood Institute (NHLBI) of the National Institutes of Health [1], American Academy of Allergy, Asthma & Immunology/ European Academy of Allergy and Clinical Immunology/PRACTALL consensus report [2], 2017 GINA Report, Global Strategy for Asthma Management and Prevention [3] and British Thoracic Society/Scottish Intercollegiate Guidelines Network (BTS -SIGN: 2016, SIGN 153) [4]. Onset of CA is earlier in males than females. Atopy is present in majority of children aged above 3 years of age and allergen-specific sensitization is one of the most important risk factor for the development of CA. However, no known medical intervention has yet shown to prevent the development of CA or helpful in modifying its natural long-term natural course. So, the only option left in management of childhood asthma is improving the quality of life by increasing their physical activity (PA).

Exercise Induced Childhood Asthma

The decrease in PA may be linked to the increased prevalence and severity of CA [5]. In contrary to that, increase in PA leads to increase diagnosed of CA [6]. There exists diverse results on PA and CA. But the recent systematic review and meta-analysis on PA and CA confirms the statement that the children who were physically inactive may have a higher risk of asthma/or wheezing compared with active children [7]. Paediatric physiotherapy plays an important role in improving their endurance and strength by guided PA. But at the same time, exercise could end up in exercise induced asthma. Exercise-induced asthma

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(EIA) is known as a transitory airways obstruction with shortness of breath, cough and wheeze immediately after vigorous exercise [8]. EIA may be supported by two hypotheses (Figure 1), osmotic hypothesis and thermal hypothesis. According to the osmotic hypothesis, asthmatic attacks may be triggered by inhaling of dry air during exercise through the dehydration of the airways generated by the water loss by the respiratory tract stimulated by increases the osmolarity of the periciliary liquids. Such process releases hence chemical mediators (histamine, prostaglandins and leukotrienes) which increase the contraction of the bronchial straight musculature, causing obstruction. The second hypothesis is thermal hypothesis which explains that, EIA is initiated by the thermal effect in the airways caused by exercise. Warming-up the cooled airways following by exercise causes a reactive hyperemia of the bronchial vasculature and edema on the airways wall [8].

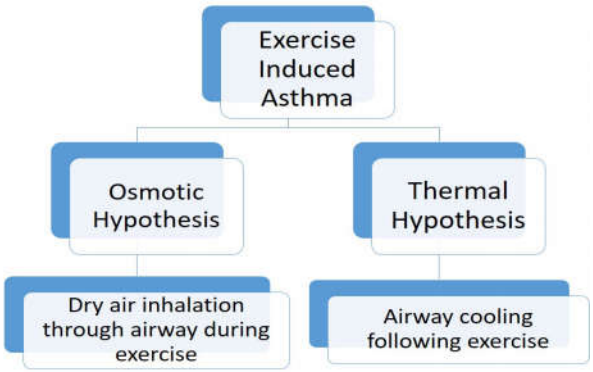

Fig.1: Hypothesis Supporting Exercise Induced Asthma

Monitoring Physical Activity by Physiotherapist

The role of physiotherapist is crucial in identifying the child with asthmatic symptoms and breathlessness due to physical activity when the child is physically active. Paediatric physiotherapist train the child with CA according to ACSM's criteria. Paediatric physiotherapist assist the children to choose appropriate kind and duration of exercise along to medication according to their fitness level. They also encourage to perform pre-exercise warm-ups and cool-downs. The available evidence suggests that PA is a possible protective factor against the children with asthma development.

Conclusion

The available evidence recommends regular PA among children with CA to minimize the recurrence of asthmatic symptoms. It also suggests that children who were physically inactive may have a higher risk of asthma/or wheezing compared with active children and PA is a possible protective factor against the children with asthma development.

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Conflict of Interest

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Standard journal article

[1] Flink H, Tegelberg Å, Thörn M, Lagerlöf F. Effect of oral iron supplementation on unstimulated salivary flow rate: A randomized, double-blind, placebo-controlled trial. J Oral Pathol Med 2006; 35: 540-7.

[2] Twetman S, Axelsson S, Dahlgren H, Holm AK, Källestål C, Lagerlöf F, et al. Caries-preventive effect of fluoride toothpaste: A systematic review. Acta Odontol Scand 2003; 61: 347-55.

Article in supplement or special issue

[3] Fleischer W, Reimer K. Povidone iodine antisepsis. State of the art. Dermatology 1997; 195 Suppl 2: 3-9.

Corporate (collective) author

[4] American Academy of Periodontology. Sonic and ultrasonic scalers in periodontics. J Periodontol 2000; 71: 1792-801.

Unpublished article

[5] Garoushi S, Lassila LV, Tezvergil A, Vallittu PK. Static and fatigue compression test for particulate filler composite resin with fiber-reinforced composite substructure. Dent Mater 2006.

Personal author(s)

[6] Hosmer D, Lemeshow S. Applied logistic regression, 2nd edn. New York: Wiley-Interscience; 2000.

Chapter in book

[7] Nauntofte B, Tenovuo J, Lagerlöf F. Secretion and composition of saliva. In: Fejerskov O, Kidd EAM,

editors. Dental caries: The disease and its clinical management. Oxford: Blackwell Munksgaard; 2003. p. 7-27.

No author given

[8] World Health Organization. Oral health surveys - basic methods, 4th edn. Geneva: World Health Organization; 1997.

Reference from electronic media

[9] National Statistics Online—Trends in suicide by method in England and Wales, 1979-2001. www.statistics.gov.uk/downloads/theme_health/HSQ 20.pdf (accessed Jan 24, 2005): 7-18. Only verified references against the original documents should be cited. Authors are responsible for the accuracy and completeness of their references and for correct text citation. The number of reference should be kept limited to 20 in case of major communications and 10 for short communications.

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