Original Article

Physiotherapy and Occupational Therapy Journal
Volume 16 Number 3, July - September 2023
DOI: http://dx.doi.org/10.21088/potj.0974.5777.16323.2

Relationship between Trunk Leg Ratio and Peak Flow Rate in Young Girls

Shakshi Naithani[1], Manmeet Kaur[2], Tripti Pandey[3], Ashish Dobhal[4]

How to cite this article:

Shakshi Naithani, Manmeet Kaur, Tripti Pandey, *et al.*/Relationship between Trunk leg ratio and peak flow rate in young girls/ Physiotherapy and Occupational Therapy Journal. 2023;16(3): 125-136.

ABSTRACT

Background & Objectives: Peak expiratory flow rate (PEFR) is an effort dependent. It remains at its peak for 10 sec. Peak expiratory flow rate may be affected by some factors affecting the normal function of the respiratory system. Such factors include the body constitution such as height, weight, sex, age etc. A study of peak expiratory flow rate and its relationship with trunk leg ratio. The trunk-leg ratio (TLR) was used in apparently healthy young females of age 10-15 years. A better understanding of the association between Trunk-leg ratio and PEFR may identify those with high chances of respiratory diseases.

Methods: A cross sectional study was conducted in which the peak flow rate of 80 school going girls, aged 10-15 years was measured with a peak flow meter. A peak flow meter and a measuring tape to scale height were used to measure the participants and written consent from their guardian was obtained before the start of procedure.

Results: There was no significant correlation between PEFR and trunk to leg ratio and trunk length and PEFR. A low correlation was found between leg length and trunk to leg ratio.

Interpretation & Conclusion: The study suggest that the trunk to leg ratio has no significance with young girls in this study.

Keywords: Peak expiratory flow; Young children; Height; Trunk to leg ratio.

Author Affiliation: [1]Associate Professor, Department of Physiotherapy, Uttaranchal (PG) College of Biomedical Sciences & Hospital, Dehradun, Uttarakhand 248001, India, [2]Associate Professor, Department of Physiotherapy, Sai Institute of Paramedical Sciences, Dehradun, Uttarakhand 248002, India, [3]Assistant Professor, [4]Associate Professor, Hemwati Nandan Bahuguna Uttarakhand Medical Education University, Dehradun 248001, Uttarakhand, India.

Corresponding Author: Manmeet Kaur, Associate Professor, Department of Physiotherapy, Sai Institute of Paramedical Sciences, Dehradun, Uttarakhand 248002, India.

E-mail: manmeetkaur.pt@gmail.com

Recieved on 19.06.2023

Accepted on 31.07.2023

© Red Flower Publication Pvt. Ltd.

INTRODUCTION

Peak expiratory flow rate (PEFR) is the maximum flow rate that occurs when you exhale forcefully through the lungs. PEFR usually indicates a large airway flow and is dependent on the patient's effort and muscle strength. Peak expiratory flow is a simple and reliable test for diagnosing and monitoring the development of airflow limitation and evaluating response to treatment. Peak Expiratory Flow Rate (PEF), also known as Peak Expiratory Flow Rate (PEFR), is the maximum value at which a person can breathe out as measured by the Peak Flow Meter, a small device used to monitor the person breathing. It measures airflow through the bronchi and how clogged or obstructed are airways. Peak expiratory flow measurement (peak flow) is a simple measure of the maximum flow during exhalation after a full inspiration. Patients can learn the procedure quickly, and the necessary equipment is inexpensive and widely available. Large organizations and advocacy groups have launched patient oriented websites with clear videos showing necessary procedures that can help doctors choose to initiate home testing for patients. Age, gender, height, weight, age difference and race are factors affecting PEFR. The PEFR among infants, children, and adults shows variation between different ethnic groups. PEFR readings are higher when the patient is healthy and lower when the airway is restricted.

Considered a good indicator of bronchial hypersensitivity and does not require saturation correction for temperature. PEFR maintenance can be performed correctly for most patients over 5 years of age. The PEFR measurement is mainly used for home monitoring of asthma, making it useful for short-term and long-term monitoring of patients. When properly performed and well defined, maximal assessment can provide patients and physicians with objective information about treatment decisions regarding the risk of death and has economic significance for individuals and health care systems.

Well known body measurements such as body mass index (BMI) and waist circumference (WC) are not reliable indicators of adipose tissue, but are universally accepted to be associated with heart disease. Therefore participants included in this were of normal BMI. There is association between height and PEFR, though there is no significance between trunk to leg length ratio. In this trunk to leg length was obtained to relate with peak expiratory flow rate. Trunk to leg length ratio can be a important for identifying elevated risk of respiratory diseases. From a public health perspective, a better understanding of the trunk to-leg ratio and other parameters may provide an opportunity to identify individuals at high risk of cardiopulmonary disease. The Trunk-to-Leg Ratio (TLR) or Leg-to-Body Ratio (LTR) is the ratio of leg length and trunk length, and a higher value of TLR indicates a higher leg length for a given height. Leg length is calculated as the difference between height and sitting height, TLR is the value obtained by dividing the leg length by the sitting height.[3]

Leg length is an indicator of the impact of obesity on the development of children of the prepubertal environment, because the increase in height to adulthood is primarily due to leg growth. Respiratory diseases are major diseases that affect children, especially in India are the leading cause of childhood morbidity and mortality.

There has been an increase of in children with respiratory diseases, especially due to factors such as environmental pollution. Therefore, pulmonary function tests are very important in the evaluation of children. PEFR is one of the lung tests that is useful in the evaluation of lung diseases, especially asthma. It also helps monitor disease progression and response to treatment.

Peak expiratory flow rate (PEFR) is a measure of the effort resulting from a large airways approximately 100-120 ms after the start of a forced exhalation. It is at the maximum for 10 ms.

The main influence on the PEFR is the diameter of the airways, which is regulated by bronchial tone. Other factors that affect PEFR are the strength of the muscles and the elastic tissue of the lungs. There is a positive correlation between height, weight, chest circumference and PEFR. PEFR is important for diagnosing and diagnosing lung function by predicting changes in air quality. Many studies have been done to determine the relationship between TLRs and cardiovascular risk, but few studies have been done on this topic. This study aimed to evaluate the relationship between body leg ratio and peak flow in healthy adolescent girls aged 10-15 years.

Finally, all children were voluntarily selected for this study. A total of 80 participants were included in this study. All participants were healthy preteen girls aged 10 to 15 years. All participants had a normal BMI.

BMI measure your height and weight, measure your height with a tape measure and take your weight with a scale. Use a tape measure to measure body length and leg length. All measurements are in centimeters. Body length is measured from the tip of the shoulders to the ilium.leg length is the distance from the iliac wing to the floor. All participants were asked to remove their shoes before measuring their leg length.

A peak flow meter was used as the measurement. An instrument was used throughout the course. There are markings and mouth piece in the graduated region of the device. Marks start between 60 L/min and 900 L/min. The diposable mouthpiece were used and mouthpiece was washed and sterilized for each subject. No nose clips were used.

Before the procedure, the purpose and method of the assessment is explained to the participants. Before measuring, the participants took a short deep breath. All participants were tested standing up.

After the actual performance, the participants were asked to take a deep breath and then blow into the mouthpiece with their best effort. Read the results from the scale. Take at least 3 readings and save the best score. Data from all participants were analyzed and the mean value of trunk to leg length was evaluated with body length, leg length and peak expiratory flow.

Relationship of trunk to leg ratio with peak expiratory flow rate was evaluated. The trunk length and leg length were also correlated with peak expiratory flow rate. The aim of this study was to analyze the relationship between trunk to leg length ratio and peak flow rate in children to better understand the relationship between trunk to-leg length ratio and PEFR and possibly identify those at risk for respiratory diseases.

AIMS & OBJECTIVES

To study the relationship between trunk leg ratio and peak flow rate in young healthy girls, to help identify those with high chance of respiratory disease. And to find effectiveness of trunk leg ratio as an indicator or factor that effects peak flow rate or lung function.

Hypothesis

Experimental Hypothesis

There is relationship between trunk leg length ratio and peak expiratory flow rate in young healthy girls.

Null Hypothesis

There is no correlation between trunk leg length ratio and peak expiratory flow rate in young healthy girls.

REVIEW OF LITERATURE

Thakur Shailesh Kaumar Singh (2014) conducted a study to correlate age, height and weight with PEFR in study population. This study was conducted on 254 subjects of 10-14 years of age. Height and weight were measured according to a standardized protocol. All the parents filled a self-administered questionnaire to obtain general information and disease history of the participant. PEFR was measured in all subjects. It included 152 boys and 102 girls. There was significant difference in height, weight and PEFR in all age groups. All parameters were higher in boys as compared to girls. Girls achieved earlier pubic hairs and breast development than males. The study concluded PEFR is indicator for respiratory diseases commonly seen in children. It is positively correlated with age, height and weight of subjects.

Bin Dong and Jun Ma (2016) conducted a study to check leg to trunk ratio and the risk of hypertension in children and adolescents. It was a population based study. A larger LTR was associated with decline levels of BP across the height and age spectrum in both sexes. The study concluded association of low LTR with elevated risk of high blood pressure in youths.

Tipnis NA Shah S. (2016) conducted a study to evaluate effect of body positions on peak expiratory flow rates in adult asthmatics. A cross sectional study was performed in 20 asthmatic subjects aged 18-50 years in whom correct instructions for PEF technique were given according to guidelines of National Institute of Health. The study concluded that there is a significant difference between PEFR values in standing, sitting with slump forward 100 and lying back 450 position. Standing position is the best option for adult asthmatics to measure their PEF values as it generated maximum PEF.

Jena et al. (2017), Studied Peak expiratory flow rate and its relation to body mass index in young adults. This was a comparative study in which healthy young adults were recruited as the subjects. Total 105 subjects were selected which included 56 male and 49 female. All subjects were between ages 18 and 24 years. This study concluded that PEFR declines with increase in BMI, and there is negative correlation between BMI and PEFR.

Harpreet Kaur et al. (2013), a study was conducted to assess variations in the Peak Expiratory Flow Rate with Various Factors in a Population of Healthy Women of the Malwa Region of Punjab. This study generated the preliminary values of PEFR for the women of the Malwa region of Punjab, India.

Jayapal J. (2016) studied postural variation in peak expiratory flow rates in healthy adult female subjects in South India. The study concluded that in postural changes, PEFR measurements significantly differ based on whether the measurements are taken in the standing or in the lying posture in healthy participants. The effect of posture may be of importance in recording PEFR and changing to a better posture may be especially useful for those patients with weak expiration.

Adama et al. (2019), The Relationship between Trunk Leg Ratio and Peak Expiratory Flow Rate was studied. This study was an analytical cross-sectional design, involving 83 Level 200 MBBS/BDS students of Bayero University. The study founded Significant correlation between the TLR, which is an anthropometric parameter and the PEFR which is an important diagnostic tool in determination of some types of respiratory diseases. This relationship signifies that the taller the person, irrespective of the trunk length, the higher the PEF.

Gupta et al. (2013) Studied Peak expiratory flow rate in highlander children. The study suggests that besides anthropometric and socio-economic factors, altitude is an important determinant of lung function.

Jena SK, Mishra AK, (2017) Studied relation of peak expiratory flow rate to body mass index in young adults. In this study 56 male and 49 female were recruited. The study concluded that PEFR declines with increase in BMI, and there is negative correlation between BMI and PEFR.

Manjunath CB (2013), studied the PEFR in healthy rural school going children (5-16 years) of belluar region for construction of nomogram.

Wallace et al (2013) studied PEFR in bed. compared 3 positions. Healthy adults performed the PEF maneuver in random order, standing, lying back at and 45° angle on pillows, and sitting, slumped forward 10° with legs extended. PEF was recorded for 3 attempts in each of the 3 positions. The study concluded that clinicians should ensure that PEF is obtained with patients out of bed and in the standing position.

Dr H Marike Boezen (1999) studied effect of ambient air pollution on upper and lower respiratory symptoms and peak flow in children. Study concluded that there were no consistent positive or negative associations between increased air pollution and prevalence of respiratory symptoms or decrease in peak expiratory flow in the other three groups of children.

Brendan Morrow (2019) studied the utility of using peak expiratory flow and forced vital capacity to predict poor expiratory cough flow in children with neuromuscular disorders. The aim of this study was to investigate the relationship between peak expiratory flow, forced vital capacity (FVC) and PCF in South African children with neuromuscular disorders. Study concluded that PEF and FVC may be surrogate measures of cough effectiveness in children with neuromuscular disorders.

David Kaminsky (2017), studied the fluctuation analysis of peak expiratory flow and its association with treatment failure in asthma. The study concluded that increased temporal self-similarity of more variable lung function (PEF) is associated with treatment failure, but the pattern of change in self-similarity leading up to treatment failure is variable across individuals.

Frischer et al (1993) conducted a study to assess relation between response to exercise and diurnal variability of peak expiratory flow in primary school children. The results showed that increased variability of PEF, as well as a response to exercise, was associated with respiratory symptoms, but only a response to exercise was closely associated with atopy (defined as a positive skin test to any of seven aero-allergens).

A.N. Aggarwal et al (2000) studied diurnal variation in peak flow rate in healthy young adults. The results concluded that there was no significant relationship between diurnal variation in peak flow rate of both sexes.

Mahmoud Zureik et al (2001) studied association between peak expiratory flow and the development of carotid atherosclerotic plaques. The study concluded that reduced lung function predicts the development of carotid atherosclerosis in elderly subjects. The nature of these associations remains largely unknown and merits further investigations. Nevertheless, assessment of lung function, which is simple and inexpensive, could help identify a population at high risk of atherosclerosis development and coronary heart disease.

M.B. Dikshit (2004) evaluated a set of regression equations for use for the Indian population.

Hegewald et al (1995) studied intra individual Peak Flow Variability. The study concluded that estimates of intra individual variability in healthy subjects are generally lower than those previously reported. Meter variability accounts for only a small part of total intraindividual variability. The 95th percentile data suggest that a fall in PEF of 6 to 8% in adults and 9 to 10% in youths would be statistically significant.

Ravi Vaswani (2005) evaluated factors affecting peak expiratory flow in healthy adults. The study concluded that position of the subject and application of nose clip has no significant impact on PEF measurement.

Reddel et al (2004) studied the personal best peak flow that can be determined for asthma action plans. The study showed that the personal best PEF is a useful concept for asthma self-management plans when determined as the highest PEF over the previous 2 weeks. With twice daily monitoring, personal best PEF reaches plateau levels after only a few weeks of corticosteroid treatment.

Chong et al (2000) studied peak expiratory flow rate and premenstrual symptoms in healthy non asthmatic women. The results showed intra subject and diurnal variability in PEFR are minimal in non asthmatic women; similarly, inter subject variability is relatively low. The menstrual cycle appears to have little effect on PEFR in healthy non asthmatic Asian women.

Debray et al (2008) conducted a comparative study of the peak expiratory flow rate of Indian and Nepalese young adults in a teaching institute. The analysis showed that height is the best predictor for PEFR in the present study.

A Bheekie (2001) analyzeded Peak expiratory flow rate and symptom self monitoring of asthma initiated from community pharmacies. The result showed PEFR self monitoring proved to be a more useful asthma tool than symptom self monitoring. Patients applying symptom monitoring tend to under estimate the severity of their condition and use medication inappropriately. Active involvement of community pharmacists in facilitating and reinforcing out patient self monitoring would help to optimize asthma management.

Enright & McClelland (2001) conducted a study to correlate peak expiratory flow liability in elderly persons. It was concluded that PEF lability at home is highly successful in elderly persons. PEF lability ≥ 30% is abnormal in the elderly and is associated with asthma.

Harirah et al (2005) studied effect of gestational age and position on peak expiratory flow rate. This was a longitudinal study. The concluded that PEFR measurements are affected by maternal position and advancing gestational age, especially in the supine position. Adjustment of patient's flow rate in relation to gestational age and maternal position is recommended, especially in pregnant women with asthma.

Maccoy et al (2010) evaluated peak expiratory flow monitoring and compared sitting versus standing measurements. The results concluded that PEF measurements do not significantly differ based on sitting or standing measurements among healthy participants. Based on the results of this study it may not be necessary for the patient to stand while performing PEF measurements. Further study among patients with asthma is warranted.

Trevisan et al (2019) studied a cross-Sectional and longitudinal Associations between Peak Expiratory Flow and Frailty in Older Adults. The findings suggested that PEF is a marker of general robustness in older adults, and its reduction exceeding that expected by age is associated with frailty development.

Jéssica Perossi (2019) analyzed peak expiratory flow in obese subjects in different positions. The study suggested that the PEF of healthy obese are similar in the standing and seated positions. The PEF decreases in the lying positions, except for the LL, that could be used as an alternative for measurements.

Kimberly Shiu (2017) studied the trunk-to-leg ratio in regions of extreme stunting prevalence in the Western Highlands of Guatemala. The results showed a stunting prevalence increases in a population, the median trunk-to-leg ratio initially falls to the 0.82 range and stabilizes thereafter, but in isolated third degree stunting, the median trunk-to-leg ratio reaches 0.85. children.

S Venkateswara Babu (2019) studied the association of overweight and pefr among children. The study showed a significant difference in the PEFR rate between obese, overweight and normal groups where higher PEFR has been reported on obese than normal. Excess weight directly and positively affects the PEFR.

Sion Jo et al. (2019) studied change in peak expiratory flow rate after the head-tilt/chin-lift maneuver among young, healthy, and conscious volunteers. The study results showed that PEFR increased by 9.6% after the HT/CL maneuver in young conscious subjects, but some subjects showed decreased PEFR after the HT/CL maneuver.

Yun-Chul (2006) conducted a study to assess lung function decrement associated with metal components in particulate pollutants. This study demonstrated that particulate pollutants and metals such as manganese and lead in the particles are associated with a decrement of PEFR.

Pallavi Chitnis (2018) conducted a correlative study of the different grades of BMI with PEFR in young adults. The result show there is increase in PEFR in overweight as compared to normal which means increased in BMI causes increase in muscle strength. In obese group PEFR is less as compared to normal group.

METHODOLOGY

Study Design

It is a cross sectional observational study to study relationship between trunk leg ratio and peak expiratory flow rate.

Study Setting

The study was conducted at Rajkiya Purva Madhyamik Vidyalaya, Rajpur Road, Dehradun; Eklavya coaching centre, turner road, Dehradun; Nari /kishori niketan Kendra, near doon university, Dehradun.

Study Duration

The study was performed over a period of two weeks.

Subjects

80 females between 10-15 years of age with BMI (18.4-24.9 kg/m^2) value were included.

Criteria for Inclusion and Exclusion

Inclusion Criteria:

Age 10-15 years

Females

BMI = 18.5–24.9kg/m^2

Exclusion Criteria:

Volunteers with Cardiorespiratory disease (Asthma, Chronic Bronchitis, Cystic Fibrosis, Congenital Heart Disease).

Neurological disease (Cerebral Palsy, Muscular Dystrophy, Epilepsy, Encephalopathy) were excluded.

Volunteers whose BMI was 25.0-29.9 or above (overweight) and less than 18.4 (underweight) were excluded.

Materials used in the Studys

Pencil

Measuring Tape

Weight Machine

Chair

Peak Flow Meter.

PROCEDURE

Sampling and Data Collection

A total of Eighty (80) students were selected as per exclusion and inclusion criteria. The procedure was explained to the volunteering subjects and their wardens/guardians signed the consent form.

For calculation of BMI, NCBI calculator was used (BMI = weight in kg/height in m^2). BMI was measured to the nearest kg.

A measuring tape was used in measuring the Trunk length and Leg length and a mini peak flow meter was used in measuring Peak Expiratory Flow Rate.

Determination of Trunk-Leg Ratio

In this study, the trunk-leg ratio was determined as follows; the subject was asked to stand in an anatomical position and a measuring tape was used to measure the trunk-length which was measured from the shoulder to the summit of the iliac crest measurement was taken to the nearest cm. With the subject still in anatomical position, the leg length was measured which was gotten from the summit of the iliac crest down to the floor. The Trunk-leg ratio was obtained by dividing the trunk length with the leg length.

Determination of Peak Expiratory Flow Rate

PEFR (L/min) was evaluated with the brand name device Mini Bell peak flow meter with a range of 60 to 900 L/min. The PEFR was obtained by a forced exhalation maneuver beginning with a maximum inhalation. Subjects were evaluated in a standing position. Prior to the evaluation, the device was described to the subjects. Afterwards, the assessment was carried out with the highest value recorded of the three attempts. The participants were asked to stand erect holding. Peak Expiratory Flow Meter with one hand and was asked to maximally breath in and then wrap the mouth around the mouth piece of the Peak Flow Meter then expire maximally into the Peak Flow Meter.

RESULTS

The study was analysed by Pearson's Moment of Correlation and independent sample t-test and the test results showed negative correlation between PEFR and trunk to leg length ratio (0.30). A moderate correlation was found between leg length and PEFR (0.58). Correlation between PEFR

Table 1: Mean value

Variables	Number (No.)	Mean ± STD
PEFR (L/min)	80	257.5± 65.61
Trunk length	80	337.975±3.99
Leg length	80	72.225±10.08
Trunk leg ratio	80	0.525±0.09

Table 2: R value and pearson correlation coefficient

Variable	No.	R-value
PEFR/Trunk leg ratio	80	-0.3083
PEFR/Trunk length	80	0.472479268
PEFR/Leg length	80	0.584613

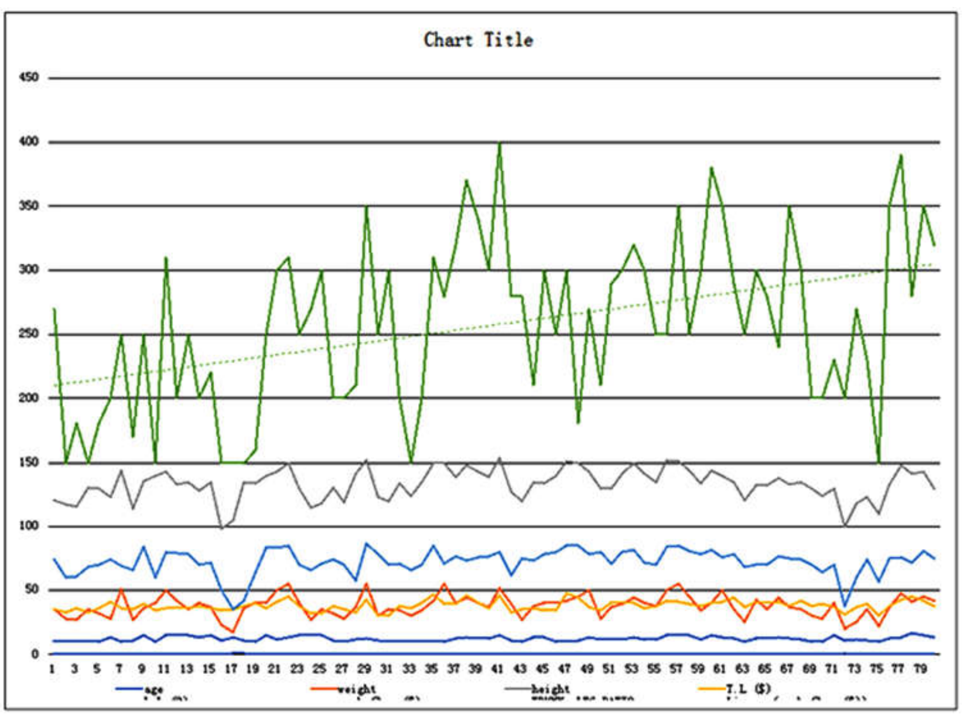

Fig. 1: Line graph

Table 3: Master Table

S. No.	Age	Weight	Height	T.L (cm)	L.L (cm)	Peak flow (L/min)
1	10	35	121	35	74	270
2	10	28	117	33	60	150
3	10	27	116	36	61	180
4	10	35	131	33	68	150
5	10	32	130	36	70	180
6	14	28	123	41	74	200
7	10	51	144	36	69	250
8	11	27	114	35	66	170
9	15	36	136	39	84	250
10	10	40	140	34	60	150
11	15	50	143	36	80	310
12	15	42	133	37	79	200
13	15	35	135	36	78	250
14	14	40	128	38	70	200
15	15	37	135	36	72	220
16	11	23	98	34	50	150
17	14	18	105	35	35	150
18	11	36	135	38	42	150
19	10	40	134	40	64	160
20	15	40	140	36	83	250
21	12	50	143	41	83	300
22	14	55	150	45	85	310
23	15	40	130	38	70	250
24	15	27	115	32	66	270
25	15	35	118	32	71	300
26	11	32	131	38	74	200
27	10	28	119	35	70	200
28	12	37	141	33	58	210
29	13	55	152	43	87	350
30	11	30	123	30	78	250
31	10	35	120	30	70	300
32	10	34	134	38	71	200
33	10	30	124	36	66	150
34	10	34	135	40	70	200
35	10	42	150	47	85	310
36	10	55	150	39	71	280
37	13	40	139	39	77	320
38	14	44	148	46	73	370
39	13	40	143	40	76	340
40	13	37	139	36	77	300
41	15	52	154	46	80	400
42	11	39	127	33	62	280
43	10	27	120	35	75	280
44	14	38	135	36	73	210
45	14	40	134	34	78	300

Table cont...

46	10	40	140	34	80	250
47	10	42	151	48	85	300
48	11	45	150	44	85	180
49	14	50	143	37	78	270
50	12	28	130	34	80	210
51	12	37	130	40	71	290
52	12	39	141	40	80	300
53	14	44	150	40	82	320
54	12	40	141	36	72	300
55	12	38	135	38	70	250
56	15	50	152	42	84	250
57	15	55	151	41	85	350
58	15	45	144	39	81	250
59	12	34	134	38	78	300
60	15	40	144	40	82	380
61	14	50	140	41	76	350
62	13	35	135	44	78	290
63	10	25	121	37	68	250
64	13	43	132	41	70	300
65	13	35	132	40	70	280
66	14	44	138	41	77	240
67	13	37	133	38	75	350
68	12	35	135	42	74	300
69	10	30	130	38	70	200
70	10	28	124	39	64	200
71	15	40	130	37	70	230
72	11	20	100	31	38	200
73	12	25	118	37	60	270
74	11	35	123	39	74	230
75	10	22	110	30	57	150
76	13	37	133	38	75	350
77	14	48	148	43	76	390
78	17	41	141	45	72	280
79	15	45	143	42	81	350
80	14	42	130	38	75	320

and tunk length was very low (0.47).

Statistical Analysis

DISCUSSION

This study was conducted to find a relation between trunk to leg ratio and peak expiratory flow rate. The young girls between age 10-15 years were taken and their trunk length and leg length was measured and their ratios were obtained. A peak flow meter was used to asses the PEFR while standing erect. Peak flow rate was obtained in Standing position, as it is the best option for as it generated maximum PEF.[7] Peak expiratory flow rate (PEFR) is a convenient and reliable measurement in diagnosing and monitoring the progress of airflow limitation and evaluating the response to treatment. There is a relationship between height, weight, chest circumferences with PEFR. PEFR is an important diagnostic and prognostic tool of lung functions which predicts variations in airflow.[8]

In this study a relationship between TLR and PEFR was obtained and in this study a negative correlation was found between both PEFR and trunk to leg ratio, which does relates with the findings of previous studies who found no significant relationship between Trunk-leg ratio and PEFR.[3]

JUN MA, *et al* study aimed to evaluate the association between ratio of height components, leg-to-trunk ratio (LTR) and high blood pressure (HBP) in Chinese children and adolescents aged 9–17. In this study, Larger LTR was associated with declined levels of BP across the height and age spectrum in both sexes. Low LTR was associated with elevated risk of HBP in youths. Their findings supported use of LTR to identify children and adolescents at elevated risk of hypertension in early life.

Peak expiratory flow rate (PEFR) is the maximum flow rate generated during a forceful exhalation, starting from full lung inflation. PEFR primarily reflects large airway flow and depends on the voluntary effort and muscular strength of the patient. PEFR is effort dependent and it and the normal range of the PEFR is related to factors such as age, height, weight, gender, race and the environmental conditions.[14] A study showed the variations of the PEFR with the age, height, weight, Body Surface Area (BSA) and the Body Mass Index (BMI) in healthy women of the Malwa region of Punjab, who were living within similar socio-cultural environments and were engaged in similar forms of physical activities. Study showed that there was an increase in the PEFRs of the study subjects with an increase in their heights.[2] A study showed that PEFR declines with increase in BMI, there is evidence that obesity has a link to bronchial hyper responsiveness.[10]

The height plays a major role in peak flow rate and other spirometric values.[13] Yanhonglu, *et al* predicted pef value for Chinese students, in this study height was the barometric variable with greatest correlation to PEF for both sexes.[12]

In this study trunk-leg ratio (TLR) was used for better understanding of the association between Trunk-leg ratio and PEFR to identify those with high chances of respiratory diseases. Thus, young children with icresaed BMI or living in polluted environment are at high chance of getting cardiorespiratory disease.

Limitations

1. The study consisted of a small number of subjects.
2. PEFR and more anthropometric parameters should be considered in children.
3. Other components should also be measured eg. FEV1.

CONCLUSION

This study concluded that there is no correlation between trunk leg length ratio and peak flow rate in young girls. The results of this study revealed moderate correlation between leg length and PEFR among the normal BMI females, also revealed no relation between the trunk length and PEFR.

Future Study

The findings suggest that further studies should look into relationship between PEFR and more anthropometric parameters.

SUMMARY

Title of Study:

To Study Relationship between trunk Leg ration and Peak Flow Rate in young girls.

Background

Being an important physiological and clinical tool in assessing respiratory conditions, it is common knowledge that Peak expiratory flow rate (PEFR) may be affected by some factors affecting the normal function of the respiratory system. Such factors include the body constitution such as height, built, sex, age etc.; The trunk-leg ratio (TLR) was used in apparently normal young adults. A better understanding of the association between Trunk-leg ratio and PEFR may identify those with elevated risk of respiratory diseases.

Objectives:

To get a better understanding of the association between Trunk-leg ratio and PEFR that may help identify those with high chance of respiratory diseases.

Materials and Method:

A total of Eighty (80) students were selected as per exclusion and inclusion criteria. For calculation of BMI, height and weight was used (BMI = weight in kg/height in m^2). A measuring tape was used in

measuring the Trunk length and Leg length and a peak flow meter was used in measuring Peak Expiratory Flow Rate.

Conclusions

There is negative correlation between PEFR and trunk to leg ratio in young girls with normal BMI.

REFERENCES

1. Singh TSK. Peak Expiratory Flow Rate in children.
2. Jena, *et al.*: Peak expiratory flow rate and its relation to body mass index in young adults.
3. Adama *et al.*; ARRB, 30(6): 1-6, 2018; Article no.ARRB.47410.
4. Ischander M, Zaldivar F Jr, Eliakim A, Nussbaum E, Dunton G, Leu SY, *et al*. Physical activity, growth, and inflammatory mediators in BMI-matched female adolescents. Med Sci Sports Exerc. 2007; 39:1131.
5. Devrieze BW, Giwaao, peak flow rate measurement (2019 march).ncbi.
6. Leg-to-trunk ratio and the risk of hypertension in children and adolescents: a population-based study, Bin Dong1,2, Zhiqiang Wang 1,2, Jun 2016.
7. Harpreet Kaur *et al.*, Variations in the Peak Expiratory Flow Rate with Various Factors in a Population of Healthy Women of the Malwa.
8. Kart L Gulmez, pulmonary function parameters in healthy people.
9. Jayapal J. A study of postural variation in peak expiratory flow rates in healthy adult female subjects in South India. Niger J Gen Pract 2016;14:11-3.
10. Chinn S, Jarvis D, Burney P; European Community Respiratory Health Survey. Relation of bronchial responsiveness to body mass index in the ECRHS. European Community Respiratory Health Survey. Thora×2002;57:1028-33.
11. Raju PS, Prasad KV, Ramana YV, Murthy KJ. Pulmonary functiontests in Indian girls – Prediction equations. Indian J Pediatr 2004;71:893-7.
12. Yanhonglu *et al,* Peak expiratory flow among healthy children aged 5-14 years in china 2018.
13. Vijay Krishna, PEFRi in normal school children and its correlation with height (sept 2014).
14. The effect of body weight on PEFR in adolescent school children from a rural area in south India (2018, aug).
15. Reddel HK, Am.j. Rspir. Crit. care med. 2009 jul 1.
16. Zannat MR *et al*, mymensingh Med J.2016.
17. JohnJ M. Paediatric PEFR normogram for Ernakulam district, India J allergy asthma immunol 2017.
18. Reddy UN, Khan MAU, Anjum S, Nasirmihiuddin M, Rao SP, Rao JN, Afreen S. Evaluation of mean peak expiratory flow rate (PEFR) of healthy children belonging to urban areas of Hyderabad. Asian Pac J Health Sci. 2012.