INDICATIONS FOR SPIROMETRY INANIGERIAN TERTIARY HOSPITAL: ARE THERE CHANGING TRENDS?

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ABSTRACT

Background: Spirometry is a noninvasive and cost-effective physiologic test that complements other investigative procedures in the evaluation of respiratory diseases.

Aim: To study the pattern of lung function in patients referred to the respiratory laboratory of Federal Medical Centre, Asaba and to determine if there are changing trends in comparison with the earlier studies.

Method: We reviewed and analyzed the records of patients referred to our respiratory laboratory from August 2015 to January 2019 (a period of three and half years).

Results: A total of 41 5 patients had spirometry evaluation under the period of study with a mean age of 56.6

INTRODUCTION

Diseases of the respiratory system are among the most common medical conditions and lead to considerable morbidity and mortality. Among these respiratory diseases, the prevalence of asthma and COPD is on the increase all over the world, especially in middle- and low-income countries. According to World Health Organization, COPD will be the third leading cause of death by 2030.

Spirometry, from the Latin word spiro - "to breathe" and the Greek word metron - “measure “is one of the oldest and most ordered tests of pulmonary function. It is a physiological test that measures how an individual inhales or exhales volume of air as a function of time. It is a valuable tool for evaluating the respiratory system'.

Spirometric evaluation of ventilatory function plays a critical role in the diagnosis, differentiation, and management of respiratory illnesses such as asthma, chronic obstructive pulmonary disease (COPD) and restrictive lung disorders. In addition, it can evaluate the possible effects of diseases of other organs/systems on lung function. Thus, spirometry could constitute an integral component of any routine health examination especially with pulmonary diseases'.

Some of the indications for spirometry are,“ evaluation for the presence or absence of a lung disease", “investigation of the effect of disease on pulmonary functions", “determination of preoperative risks"," monitoring occupational exposure”, “determination of disabilities” and “comparison of the health status of societies".

Forced expiratory volume in one second is one of the parameters measured in spirometry and it measures the mechanical properties of the lungs. It is decreased in both obstructive and restrictive lung diseases.

Forced vital capacity is a measure of the lung volume and is usually reduced in discuses that cause the lungs to be smaller e.g. restrictive lung disease and disorders of the bellows like kyphoscoliosis and neuromuscular weakness'.

The FEVI and FVC ratio is also compared and is reduced in obstructive disorders, however, in restrictive disorders it is normal or elevated.

Despite the ever-increasing demand for the use of spirometry in the assessment of various respiratory conditions, it appears that the request for this simple procedure is still low in developing countries. Seemingly, spirometry service is relatively new to many health practitioners as most are not aware of this service. Therefore, there is paucity of data in studies carried out in this area.' Many of the studies carried out on spirometry were mainly for dissertations and fellowship award. Studies on the use of spirometry are scarce in this region. We therefore retrospectively studied the spirometry records of the respiratory unit of Federal Medical Centre Asaba with a view to determine the indications for spirometry and to assess whether there are changing trends in comparison to other studies.

PATIENTS'MATERIALS AND METIIODS

Study Location: Federal Medical Centre Asaba is a 312 bed facility located in Asaba South -south Nigeria that serves as a tertiary level referral center from surrounding parts of Delta State, and from neighboring states like Anambra and other states in southeastern Nigeria.

Asaba is located at the western bank of river Niger and is well known for social amenities like hotels, clubs, cinemas, event centers etc. The Niger Bridge connects Asaba the administrative capital and the seat of government of Delta State and Onitsha the major commercial city in Anambra Stale.

Study Design/Methods

A retrospective cross-sectional study was carried out on consecutive subjects who had spirometry in FMC Asaba from August 2015 to January 2019 (a period of three and half years). The information gathered from each subject included bio data, anthropometry, source of referral, indication for spirometry and details of the ventilator measures taken.

Data Analysis

The data collected was analyzed using statistical packages for social sciences (SPSS) version 26.0. The data was summarized using the mean for quantitative variables, while frequencies were used to summarize using the mean for quantitative variables. The distribution of data was shown on frequency tables.

Ethical Approval

Approval for the study was obtained from the ethicaI committee of FMC, Asaba.

RESULTS

A total of 415 patients were used for the research purpose.

Sex	Number
Male	205
Female	210
M:F Ratio	1:1.02

Table 1: Sex distribution of patients referred for spirometry in FMC Asaba

	RANGE	MEAN
AGE(Years)	7 to 91	56.6 ± 11.6
11EIGIIT (meters)	0.265 to 1.98	1.032
WEIGHT (kilograms)	14 to 118	63.21

Table 2: Average age, height and weight of patients referred for spirometry in FMC Asaba

AGE	FREQUENCY	PERCENTAGE%
0-9	8	1.93
10 19	32	7.71
20 29	130	31.33
30-39	60	14.46
40-49	28	6.74
$50-59$	35	8.44
60-69	33	7.95
70 79	75	18.07
80-89	12	2.89
90-99	2	0.48
TOTAL	415	100

Table 3: Age distribution of patients referred for spirometry in FMC Asaba

Height Range(m)	Frequency(n)	Percentage (%)
120-129	20	4.82
130-139	34	8.19
140 149	23	5.54
150 159	70	16.87
160 169	138	33.25
170 179	90	21.69
180-189	22	5.30
	18	4.34
TOTAL	415	100

Table 4: Height distribution in spirometry evaluation at Federal Medical Centre. Asuba

Weight Range(m)	Frequency(n)	Percentage(%)
10-20	4	0.96
21-30	7	1.69
31 40	10	2.41
41 50	40	9.64
51-60	85	20.48
61 70	110	26.51
71-80	77	18.55
81-90	48	11.57
91-100	21	5.06
101-110	9	2.17
111-120	4	0.96
TOTAL	**415**	**100**

Table 5: Weight distribution in spirometry evaluation at Federal Medical Centre,Asaba.

BMI Distribution

Table 6: BMI distribution in spirometric evaluation at Federal Medical Centre.Asaba.

	BMI(Kg/m2)	Frequency	Percentage(%)
Very Severe Underweight	<15.9	4	0.96
Severe Underweight	16.0-16.9	7	1.69
Underweight	17.0-18.4	27	6.51
Normal	18.5-24.9	101	24.33
Overweight	25.0-29.9	108	26.03
Obcsity Class I	30.0 34.9	99	23.85
Obesity Class II	35.0 39.9	67	16.15
Obesity Class 111	>40	2	0.48

Table 6: BM4I distribution in spirometric evaluation at Federal Medical Centre,Asaba.

OCCUPATION	FREQUENCY	PERCENTAGE
Civil Scrvant	100	24.10
Youth Corps Member	83	20.0
Undergraduatc	63	15.18
Business	42	10.12
Pcnsioncr	24	5.78
Farmer	22	5.30
Clergy	10	2.41
Pupils	10	2.41
Teacher	9	2.17
Nursc	8	1.93
Fashion Designer	7	1.69
Banker	6	1.45
Engineer	6	1.45
Caterer	5	1.20
Driver	6	1.45
Unemployed	6	1.45
Medical Doctor	4	0.96
Artisan	4	0.96
TOTAL.	415	100

Table 7: Occupations of participants for spirometric evaluation at Federal Medical Centre, Asaba

INDICATIONS

INDICATIONS	FREQUENCY	PERCENTAGE
Unexplained dlyspnea	23	5.54
Asthma	133	32.01
COPD	81	19.52
Cor Pulmonale	3	0.72
Ilypertensive Ieart Discase	15	3.61
Medical Fitness	130	31.33
Chronic Cough	19	4.58
Seizure Disorder	1	0.24
Unexplained cough	1	0.24
Unexplained Chest pain	3	0.72
Surgery	6	1.45
TOTAL	415	100

Table 8: Indications for spirometric evaluation at Federal Medical Centre, Asaba

SPIROMETRIC OUTCOME	n(%)
Normal	255(61.45)
Obstructive	98(23.61)
Mixed	42(10.12)
Restrictive	20(4.82)
Total Reversibility Test	
Total	160
Significant bronchodilation	99
Non-significant	61

DISCUSSION

A total of 415 patients had spirometry done in the stud period of three and half years showing increasing spirometric utilization when compared with earlier studies in Enugu (52 over three years)'" Ilorin (119 over 9 years)' and Nnewi (117 in two years)

The review of the pattern of lung function done in our center in the study period showed a female preponderance with male to female 1:1.02.This is similar to an audit of spiromctry at a tertiary center in lkeja' with male to female ratio of 1:1.02 and Enugu' with a male to female ratio of 1:1.08.It however contrasts with a study done in Ituku-Ozalla'" which reported male preponderance of 53.1%.

Majority (70.1%) of the patients who had1.the test were less than-60 years showing that many in the young and middle-aged population were involved.

This could be because asthma, which had the highest indication for the test, occurs more in young and middle-aged groups. This pattern conformed to similar Nigerian Studies done at Enugu', Ilorin', Nnewi", Ikeja', and Ituku-Ozalla' but contrasts with a Canadian study" where the majority were elderly.

There appears to be a bimodal representation in the age groups that were tested with the highest being 20- 29years (31.33%) followed by the age group 70-79 years (18.07%). This may reflect the prevalence of the two commonest diseases for which spirometry was requested in this study Asthma and COPD, and its use for screening undergraduates and NYSC members.

The height and weight of the patients showed a typical Gaussian distribution with central clustering and a few outliers.

Working in the civil service was the commonest occupation (24.10%). This is because Asaba is mainly a civil service state. This is closely followed by NYSC members (20.00%) and undergraduates (15.18%).

Bronchial asthma (32.01%) was the commonest indication for spirometry in this study. This pattern is in keeping with the findings in most local studies and Australia'2 but contrast the Nepal' study where COPD is commonest.

However, this is closely followed by routine screening for medical fitness (31.33%). This is not in keeping with other studies where bronchial asthma is followed by COPD and interstitial lung diseases

The most common outcome in this study is normal spirometry result (61.45%), followed by obstructive pattern (23.61%). This is similar to the findings of studies of spirometry done in most studies' 'but contrasts the llorin' study which was more of obstructive (50.4%). This may be because many normal patients had routine screening for medical fitness. Furthermore. commencement of treatment for majority of the asthmatic patients before they are sent for spirometry could account for this.

An important observation in this study is the low request for spirometry for pre-operative evaluation from the surgical unit (1.45%).

This contrasts sharply with other studies where pre-operative evaluation accounted for as high as 17% (Enugu)' and 13%(lkeja)".

The need for spirometry for pre-operative pulmonary evaluation is important to reduce post-operative complications especially for thoracic and abdominal surgeries. Ufoaroh et al showed that pre-operative pulmonary symptoms were associated with high post-operative pulmonary complications.

CONCLUSION: There is an increasing use of spirometry in respiratory care and the trend suggests increased spirometric request or medical screening prior to employment into the Civil service, NYSC and admission into schools.

Low request for pre-operative evaluation makes it necessary for awareness creation among surgical units for the benefit of patients going for abdominal and thoracic surgeries.

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