

# Health Assessment and Disorders of External Respiration Function among Physicians

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**Abstract**—Aims and Objectives: Assessment of health status and detection disorders of external respiration functions (ERF) during preventative medical examination among physicians of Armenia. Subjects and Methods: Overall, fifty-nine physicians (17 men and 42 women) were examined and spirometry was carried out. The average age of the physicians was 50 years old. The studies were conducted on the Micromedical MicroLab 3500 Spirometer. Results: 25.4% among 59 examined physicians are overweight; 22.0% of them suffer from obesity. Two physicians are currently smokers. About half of the examined physicians (50.8%) at the time of examination were diagnosed with some diseases and had different health-related problems (excluding the problems related to vision and hearing). FVC was  $2.94 \pm 0.1$ , FEV1 –  $2.64 \pm 0.1$ , PEF –  $329.7 \pm 19.9$ , and FEV1%/FVC –  $89.7 \pm 1.3$ . Pathological changes of ERF are identified in 23 (39.0%) cases. 28.8% of physicians had first degree of restrictive disorders, 3.4% – first degree of combined obstructive/restrictive disorders, 6.8% – second degree of combined obstructive/restrictive disorders. Only three physicians with disorders of the ERF were diagnosed with chronic bronchitis and bronchial asthma. There were no statistically significant changes in ERF depending on the severity of obesity ( $P > 0.05$ ). Conclusion: The study showed the prevalence of ERF among physicians, observing mainly mild and moderate changes in ERF parameters.

**Keywords**—Armenia, external respiration function, health status, physicians.

## I. BACKGROUNDS

THE health status of physicians deserve attention because their relevance to the protection of their own health can directly affect the resultant efficiency of health care. The leading role in the formation of patient motivation, aimed at implementation of the recommendations for the preservation and maintenance of the health are health care workers, in particular physicians [2], [6], [10], [16]. One of the essential conditions of the medical profession is to own physical, mental and social well-being, which is ultimately reflected in the quality and safety of care. The study of the health of this contingent has a special interest because in terms of their lifestyle, physicians have always been considered as a "group of model" for the rest of the population.

Armenia is a small mountainous country. The total population of the country in 1 January, 2014 was 3 010.600 people [14]; 2 015.100 people of the total number made up working-age group (allowable working age for men ranged from 16 to 62 years old; for women – 16 to 60 years old). 64.1% of the total population is urban, and 35.9% – rural,

34.8% of the population is engaged in agriculture, forestry and fishing, 10.9% – in trade, 9.3% is employed in education and 4.5% (7.5% women and 1.7% men) – in human health and social work activities [13].

According to the National Statistical Service of Armenia, in 2014 [12], the entire number of physicians with higher medical education (including all specialties) engaged in medical treatment, sanitary organizations, social security, scientific-research, personnel training and in public health service is 12 896. This indicator takes into account both stomatologists with the complete higher education and dentists with secondary specialization. The number of medical institutions is 1017 (hospitals – 130, out-patient and dispensary aid medical institutions – 509, antenatal clinics and children's polyclinics – 378). In such condition of wide network of health care facilities and sufficient supply of physicians, it is urgent to analyze the health status of physicians and implementation of mechanisms to preserve their health. It is the guarantee to provide one of the most important state functions – health protection and working ability of population.

In recent decades, respiratory diseases take the leading place in the structure of morbidity of adult population. Thus, according to the National Statistical Service of Armenia in 2014, the incidence of the respiratory disorders was 11 631.6 cases per 100 000 people [12]. Among the respiratory diseases of a special group are chronic nonspecific respiratory diseases. Features of clinical picture of this condition, as well as late appealability of patients and irregular treatment often lead to early disability and poor quality of life. Primary prevention, diagnosis, treatment and prevention of complications of the disease are relevant in all age groups. Complex assessment of respiratory function is a reliable method for early detection of chronic respiratory diseases.

## II. THE PURPOSE AND METHODS

The purpose of this study was health assessment and identification of respiratory function disorders among physicians. To achieve this goal, a comprehensive medical examination via screening tests has been conducted in one of medical centers in Armenia. Diverse groups of physicians were presented by specialists of primary health care (general practitioners and narrow specialists), specialists of secondary health care (hospitals – narrow specialists), specialists of sanitary profile, pathologists and stomatologists.

The plan of examination included a general somatic examination, instrumental and laboratory examinations. Anthropometric indices were taken (height and weight), to

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determine the level of blood pressure and the level of fasting blood glucose. A total 59 physicians were examined and spirometry was carried out. ERF studies were carried out on the unit Micromedical MicroLab 3500 Spirometer. The indicator is calculated by the methods of [1], [9].

Each participant was informed about the purpose of the research carried out on the voluntary basis of participation. All of the participants were sent letters of agreement. The study was approved by the local ethics committee.

The statistical processing of the obtained data was done by using Microsoft Excel XP and SPSS software (Statistical Package for the Social sciences, version 16.0). Methods of descriptive statistics (significance is equal to 95%) and probability theory were used.

### III. RESULTS AND DISCUSSION

More than half of the examined physicians (71.2%) were women and 28.8% – men (Table I). Age of the examined physicians ranged from 24 to 83 (average age was 50). Subjects were predominantly physicians aged 40-44 years (15.3%). Most of examined physicians (79.7%) were married, 8.5% divorced, 8.5% widows and widowers, and 3.3% not married. Most of the physicians (89.8%) had children. About half of the physicians (50.8%) had work experience of 20 years or more.

TABLE I  
CHARACTERISTICS OF THE SAMPLE STUDIED PHYSICIANS

Index		All physicians (n=59)
Gender	Male	17 (28.8%)
	Female	42 (71.2%)
Age, years (mean±SD)		49.6±14.9
Age groups	<29	6 (10.2%)
	30-34	4 (6.8%)
	35-39	8 (13.6%)
	40-44	9 (15.3%)
	45-49	2 (3.4%)
	50-54	7 (11.9%)
	55-59	5 (8.9%)
	60-64	10 (16.9%)
	65-69	-
	>70	8 (13.6%)
Marital status	Married	47 (79.7%)
	Divorced	5 (8.5%)
	Widows (widowers)	5 (8.5%)
	Not married	2 (3.3%)
Children	Yes	53 (89.8%)
	No	6 (10.2%)
The presence of diseases		30 (50.8%)
Number of diseases	1	18 (30.5%)
	2	5 (8.5%)
	3	5 (8.5%)
	4	2 (3.4%)

According to WHO official statistics, obesity is one of the widespread diseases that threaten today's civilization; 7% of the population worldwide are obese, and 9-20% of the population in most western European countries suffer from obesity, too [3], [17]. Studies have shown the negative impact of obesity on the course of chronic bronchopulmonary diseases [4], [7], [18]. In our study, the body mass index

(BMI) was used to determine the degree of obesity among physicians.

Analysis of the data distribution of BMI (Table II) shows that only 42.4% physicians (41.2% men and 42.9% women) exhibit normal BMI (18.5-24.9 kg/m<sup>2</sup>). 25.4% among 59 examined physicians are overweight (25.0 to 29.9 kg/m<sup>2</sup>), and 22.0% of them are obese (>30.0 kg/m<sup>2</sup>). In accordance with BMI value the first degree of obesity (30 to 34.9 kg/m<sup>2</sup>) is found in 11.9% of physicians, second degree of obesity (35.0 to 39.9 kg/m<sup>2</sup>) in 8.5% of physicians, and the third degree of obesity (more than 40kg/m<sup>2</sup>) in 1.7% of the examined physicians. There was no statistically significant difference in the distribution of the degree of obesity according to gender and age group (P>0.05). At the same time, it was found that physical activity is low among physicians who do not seem to lead a healthy lifestyle. About a third of the examined physicians (27.7%) lead passive lifestyle. These findings suggest non-compliance with healthy lifestyle among physicians. Numerous scientific research shows [5], [11] that health behavior among physicians is an important marker of how the public perceives harmful lifestyle.

The results of the medical examination of physicians showed that approximately half of the examined physicians (50.8%) at the time of examination were diagnosed with some diseases and had different health-related problems (excluding the problems related to vision and hearing), and 12 out of 30 sick physicians had two and more pathologies simultaneously.

The analysis of morbidity among physicians showed that a high level of incidence occurs in diseases of cardiovascular system (30.8%), endocrine system (12.3%), the digestive system (10.8%), respiratory system (10.8%), and musculoskeletal system (9.2%). Three physicians suffered from chronic respiratory diseases (bronchial asthma and chronic bronchitis). Only 26.7% of the overweight physicians are healthy, and 38.5% of them suffer from obesity.

Further medical examination revealed that 20% physicians suffered from arterial hypertension and 7.7% from diabetes mellitus. However, at the moment of examination 36.9% physicians had high blood pressure (> 140/90 mmHg) and 3.1% physicians high normal blood pressure (130/85 to 139/89 mmHg). In 20% of 59 examined physicians, the fasting glucose level exceeded normal levels (>5.5 mmol/L), and in 8.5% of them (5 physicians), the fasting glucose level was more than 7.0 mmol/L. In 30.8% cases, overweight and obesity are associated with increased blood pressure. At 9.2% of examined physicians overweight, high blood pressure and elevated levels of blood glucose were simultaneously detected.

Each physician was asked to give detailed information about their past and present smoking habits according to the following categories: Current smokers (defined as those who smoked at least one cigarette per day), never smokers (those who had never been tobacco users in their life), and former smokers (those who had not smoked for the past six months or so).

Smoking prevalence in Armenia is higher among males. According to survey in 2002, 64.0% of adult male population

and 1.0% of adult female population currently smoked [8], [15]. The health implications of high smoking prevalence in Armenia are now being manifested in higher morbidity rates of heart disease, cancer, and respiratory diseases in the

resident population [12]. Our data show that only 3.4% physicians are currently smokers, 8.5% are former smokers and 78.1% non-smokers. These findings are explained by the predominance of women in healthcare service.

TABLE III  
THE DISTRIBUTION OF BODY MASS AMONG PHYSICIANS

Body Mass Index (KG/M <sup>2</sup> )	Male (n=17)	Females (n=42)	Both Genders (n=59)
Underweight (BMI <18.5)	-	-	-
Normal weight (BMI 18.5-24.9)	7 (41.2%)	18 (42.9%)	25 (42.4%)
Overweight (BMI 25.0-29.9)	5 (29.4%)	10 (23.8%)	15 (25.4%)
Obesity, first degree (30-34.9)	2 (11.8%)	5 (11.9%)	7 (11.9%)
Obesity, second degree (35.0-39.9)	1 (5.9%)	4 (9.5%)	5 (8.5%)
Obesity, third degree (> 40.0)	1 (5.9%)	-	1 (1.7%)
Missing data	1 (5.9%)	5 (11.9%)	6 (10.2%)

TABLE III  
AVERAGE VALUES OF INDICES OF EXTERNAL RESPIRATORY FUNCTION AMONG PHYSICIANS

Indices	Male (n=17)	Females (n=42)	Both Genders (n= 59)
FVC	3.79±0.8*	2.59±0.6	2.94±0.8
FVC, %	91.8±16.7	88.4±13.2	89.4±14.2
FEV <sub>1</sub>	3.42±1.0*	2.33±0.6	2.64 ±0.9
FEV <sub>1</sub> , %	100.1±19.4	93.1±14.5	95.1±16.2
FEV <sub>1</sub> /FVC, %	88.7±11.6	90.1±9.9	89.7±10.4
FEV <sub>1</sub> / FVC, % predicted	113.2±12.2	113.1±12.3	113.1±12.2
PEF	479.8±179.4*	268.9±86.9	329.71±153.3
PEF, %	93.2±29.3	71.6±21.2	77.8±25.5
FEF 25	2.5±1.5	1.8±0.8	1.9±1.1
FEF 25, %	130.9±57.1	112.8±42.9	118.0±47.4
FEF 50	5.3±2.3	3.7±1.2	4.1±1.7
FEF 50, %	111.5±40.8	94.5±26.9	99.4±32.1
MEF	4.5±2.2	3.1±0.2	3.5±1.6
MEF, %	112.9±40.7	95.4±42.5	100.5±32.6

\*- P-value <0.001

TABLE IV  
THE STRUCTURE OF THE STATE OF ERF AMONG PHYSICIANS

External Respiratory Function	Male (n=17)	Females (n=42)	Both Genders (n=59)
The normal state of external respiration	11(64.7)	25 (59.5)	36 (61.0)
Restrictive disorders of first degree	3 (17.6)	14 (33.3)	17 (28.8)
Combined disorders of first degree with a predominance of the restrictive disorders	2 (11.8%)	-	2 (3.4)
Combined disorders of second degree with a predominance of the restrictive disorders	1 (5.9)	3 (7.1)	4 (6.8)

Analysis of lung function among physicians showed (Table III) that the average FVC was 2.94±0.8l, FEV<sub>1</sub> 2.64±0.9l and PEF 329.7±153.3. The average values of these parameters were significantly higher among men than women (P <0.001). The average value of FEV<sub>1</sub>/FVC, % was 89.7±10.4 (88.7±11.6 for men, and 90.1±9.9 for women; P> 0.05).

Studies of the functional state of respiratory system showed that observed ventilation changes of lung function are predominantly of restrictive type (Table IV). Restrictive type of disorders can be triggered by pulmonary and extrapulmonary causes. Among the extrapulmonary reasons, lesions of the thoracic spine, ribs, respiratory muscles, inflammatory and fibrous changes in the pleura, as well as the high standing of the diaphragm should be noted. Analysis of the data showed that pathological changes in respiratory

function are identified in 23 (39.0%) cases. Distribution of ERF changes in terms of severity showed that 28.8% of physicians had first degree of restrictive disorders, 3.4% the first degree of combined disorders, 6.8% the second degree of combined disorders. There were no statistically significant differences in the distribution of ERF according to gender (P>0.05).

Among physicians with impaired ERF, 74% had been diagnosed with chronic diseases of different organ systems, only 26% of physicians were healthy (Fig. 1). At the same time, half of the physicians with normal external respiration data were marked with different diseases. Only three physicians with infringement of ERF had a history of diagnosed respiratory disease with bronchial obstruction: chronic bronchitis (first degree of combined disorders) and

bronchial asthma (first degree of the restrictive disorders). However, four physicians with combined disorders of ERF (obstructive-restrictive type) had no respiratory diseases. As a result of the research, we found no statistically significant changes of ERF, depending on the severity of obesity ( $P > 0.05$ ).

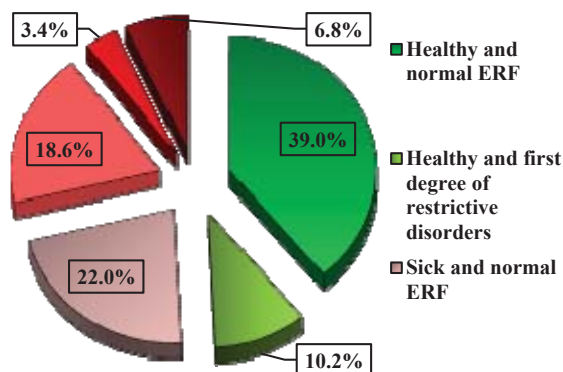


Fig. 1 State of external respiration and health of physicians

#### IV. CONCLUSION

The study showed the health status and prevalence of disorders of respiratory function among physicians, observing mainly mild and moderate changes of respiratory function parameters. Research analysis of lung function among physicians without clinical signs of bronchopulmonary pathology contributed to the detection of early signs of the disease. Thus, these results suggest that the use of the spirometry allows diagnosing the early stages of the disease of the respiratory system.

Most of the physicians do not care about their own health and do not take generally accepted preventive measures. Medical and social programs oriented at preserving and maintaining the health of physicians should include conducting periodic medical examinations, the rehabilitation program, the organization of work and rest. Pulmonary rehabilitation program should involve patient assessment, exercise training, education, nutritional intervention, and psychosocial support. Providing adequate attention to health of physicians can help reduce the number of professional errors in health care and improve the quality of medical service.

#### ACKNOWLEDGMENT

This work was financially supported by the Ministry of Education and Science of Armenia (code of scientific theme: 11-3d512). The author would like to thank physicians who volunteered participation and hospital administrators for their kind cooperation and help with data collection.

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