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THE INFLUENCE OF BRONCHIAL ASTHMA ON THE QUALITY OF LIFE AND SEXUAL FUNCTIONING OF WOMEN

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The aim of this study was to evaluate the effect of bronchial asthma on quality of life and sexual functioning of women. The study was conducted in a population of 72 women aged 18-45 (31 women treated for bronchial asthma and 41 healthy women). A specific questionnaire with a Polish version of Short Form-36 and Female Sexual Function Index was used as a research tool in this study. We found that the quality of life parameters for women with asthma were lower than for the controls in the following aspects: limitations due to physical health, limitations due to emotional problems, social functioning, energy/fatigue and emotional well-being. Asthmatic women showed worse sexual functioning in sexual arousal, lubrication, orgasm, sexual satisfaction, and pain domain. Sexual dysfunctions were diagnosed in 25.8% of asthmatic women and 17.1% of controls (P>0.05). In conclusion, bronchial asthma decreases quality of life and sexual functioning among women.

Key words: *bronchial asthma, quality of life, sexual functioning*

INTRODUCTION

Bronchial asthma is a chronic inflammatory process of respiratory tract in which a role is played by many cells and mediators. The inflammatory process leads to hyperreactivity of airways, which results in recurring episodes of wheezing, breathlessness, chest tightness and coughing, occurring especially at night or early in the morning (1). Bronchial asthma affects a population of some 300 million adults across the world. The incidence of asthma and the triggering of its clinical symptoms are due to ontogenic factors (genetic factors, obesity, gender) and environmental factors (allergens, occupational factors, tobacco smoke, air pollution and dietary habits) (1).

Disorders related to bronchial asthma reduce physical activity of patients, hamper job performance, interrupt sleep at night, force patients to get frequent medical appointments and undergo active pharmacotherapy, and sometimes are even a reason for hospitalization. The above restrictions can negatively affect quality of life and impair sexual functioning. The issue of the quality of life, and especially sexual life, of patients with bronchial asthma is very often overlooked in the clinical practice, in the doctor-patient relationship (2, 3). Therefore, in the present study we set out to evaluate the effect of bronchial asthma and its severity on the quality of life and sexual functioning of women.

MATERIAL AND METHODS

The research encompassed a population of 200 women aged between 18 and 45. The inclusion criteria for the subjects were: diagnosis of bronchial asthma, regular menstrual cycles, clinically or ultrasonographically estimated normal size of the uterus, normal cervical smear, maintained sexual activity, and informed consent for participation in the study. Excluded from the research group were patients with diagnosed gynecological disorders (e.g., uterus fibroids, endometriosis), with a medical history of depression or who were treated due to depression, who used drugs possibly impeding sexual function, and with diagnosed organic causes of sexual disorders.

128 patients were excluded as they did not meet all the inclusion criteria. The group of asthmatic women consisted of 31 women treated for bronchial asthma. The control group consisted of 41 healthy women who reported to Outpatient Gynaecological Clinics for routine gynecological examination, cytological examination, or continuation of oral hormonal contraception.

The asthma group was then divided into four subgroups depending on the clinical form of bronchial asthma (1): subgroup I – sporadic asthma (n=11; 35.5%), subgroup II – mild chronic asthma (n=4; 12.9%), subgroup III – moderate chronic asthma (n=5; 16.1%), and subgroup IV – severe chronic asthma (n=11; 35.5%).

The research tool was a questionnaire, voluntarily and anonymously filled in by the respondents from the study and control groups. The questionnaire was comprised of a general part concerning socio-demographic conditions (age, marital status, education, occupational activity, type of work, physical activity, cigarette smoking, stress exposure); medical history and health problems; obstetric and gynecological history; a part dedicated to bronchial asthma (intensity and frequency of symptoms, duration of bronchial asthma) and a detailed part in the form of self-evaluation inventories: Polish version of Short Form-36 Health Survey (SF-36) and Female Sexual Function Index (FSFI) evaluating general quality of life as well as female sexual behaviour and sexual dysfunctions.

Short Form-36 Health Survey (SF-36)

SF-36 is a standard diagnostic tool evaluating various health-related aspects of quality of life over the previous 4 weeks (4, 5). Its usefulness in determining specific parameters has been approved based on a number of studies in over 130 different clinical conditions (5, 6). The validity, sensitivity, reliability, internal consistency and stability, as well as test-retest reliability have frequently been confirmed and documented by approximately 4000 publications (5, 6).

SF-36 contains 36 questions grouped into 9 categories: general health, health change, physical functioning, limitations due to physical health, limitations due to emotional problems, social functioning, pain, energy/fatigue, emotional well-being. These categories are grouped into two

collective domains: physical health and mental health (4, 5, 7). The score in each category may be from 0 to 100 points (mean value calculated on the basis of individual items encompassed within a given category), which results in a linear dependence – the higher the score, the higher the evaluation of a given quality of life category (4, 5, 7).

Female Sexual Function Index (FSFI)

FSFI is a multidimensional self-evaluation instrument for all spheres of female sexual functions: sexual desire, sexual arousal, orgasm and sexual satisfaction within the previous 4 weeks (8-10). FSFI has been confirmed and clinically documented with regard to validity, sensitivity, reliability, internal consistency, stability and test-retest reliability in the diagnosing of disorders in sexual desire (9, 10), arousal (8, 10), orgasm (9, 10) as well as pain-related sexual disorders (10).

FSFI is composed of 19 items divided into 6 collective domains (subscales): sexual desire, sexual arousal, lubrication, orgasm, sexual satisfaction and pain (8-10). Final results are obtained separately for each of the subscales by summing up the elementary points encompassed within each of the 6 domains and a selected coefficient. The interpretation of partial results is a linear dependence: the higher the score, the better the sexual functioning within a given category (8-10). Clinically significant female sexual dysfunctions are diagnosed at values lower or equal to 26 points of FSFI scale (10).

In the statistical analysis, STATISTICA 6.0 for Windows was used. Differences among parameters were considered significant at a level of 0.05. The statistical analysis made use of: Mann-Whitney U test, Fisher test, and a model of multiple regression.

RESULTS

The mean age of asthmatic women was 34.16±7.75 years, and in the control group - 35.41±9.52 years (P>0.05) (*Table 1*). The study and control groups were comparable with respect to: age, body mass index (BMI) and waist-to-hip ratio (WHR), education, marital status, occupational activity, type of work performed, regular physical activity, menstrual cycle parameters, oral

Table 1. General profile of the study population.

Characteristic	Asthmatic women			Healthy women			U Mann-Whitney test
	Mean ±SD	Min	Max	Mean ±SD	Min	Max	
Age (years)	34.16±7.75	18.00	45.00	35.41±9.52	18.00	45.00	NS
BMI (kg/m^2)	22.11±2.73	17.60	30.00	22.84±3.95	17.10	34.89	NS
WHR	0.81±0.07	0.70	0.97	0.78±0.06	0.67	0.93	NS
Duration of asthma (years)	7.77±6.93	1.00	29.00	-	-	-	-
Age of menarche	13.48±1.46	11.00	16.00	13.62±1.17	11.00	16.00	NS
Length of menstrual cycle (days)	29.00±1.50	26.00	32.00	28.61±2.97	21.00	35.00	NS
Length of menstruation (days)	4.96±0.91	4.00	7.00	4.84±1.55	0.00	9.00	NS
Number of pregnancies	0.97±1.08	0.00	3.00	1.42±1.52	0.00	5.00	NS
Number of miscarriages	0.19±0.48	0.00	2.00	0.20±0.69	0.00	3.00	NS
Number of cigarettes a day	0.16±0.90	0.00	5.00	2.79±6.07	0.00	20.00	P=0.006

BMI - body mass index; WHR – waist-to-hip ratio; SD – standard deviation

contraceptives (OC) use, number of pregnancies, miscarriages and gynecological operations in the medical history (*Table 1* and *Table 2*). Statistically significant differences concerned: cigarette smoking and stress exposure (*Table 1* and *Table 2*). With respect to smoking, a higher percentage of smokers was noted among the healthy women (31.7%) in comparison with the 3.2% of the asthmatic ones (P=0.019) (*Table 2*). The number of cigarettes a day was also several times higher among the control group compared with the asthmatic women (2.79±6.07 *vs*. 0.16±0.9, respectively) (P=0.006) (*Table 1*). The asthmatic women subjectively evaluated their exposure to high stress at a level of 80.6% in comparison with 95.1% of healthy women (P=0.024) (*Table 2*). Duration of bronchial asthma ranged from 1 to 29 years, with a mean of 7.77±6.93 years (*Table 1*).

Quality of life

The quality of life parameters for asthmatic women were generally lower than for the control group, and this concerns almost all categories: general health, physical functioning, limitations due to physical health, limitations due to emotional problems, social functioning, pain, energy/fatigue, emotional well-being. Significant differences were found in five parameters of SF-36 scale (limitations due to physical health, limitations due to emotional problems, social functioning, energy/fatigue, emotional well-being) (*Table 3*).

Table 2. Sociodemographic characteristics of the study population

Characteristic		Asthmatic women		Healthy women		Fisher test
		n	%	n	%	
Marital status	single	12	38.7	12	29.3	NS
	married	19	61.3	25	61.0	NS
	divorced	-	-	4	9.8	NS
Education	vocational	6	19.4	3	7.3	NS
	secondary	11	35.5	22	53.6	NS
	higher	14	45.6	16	39.0	NS
Occupational activity	manual	3	9.7	6	14.6	NS
	white-collar	17	54.8	19	46.3	NS
	not working	11	35.5	16	39.0	NS
Regular physical activity		30	96.7	37	90.2	NS
Smoking women		1	3.2	13	31.7	P=0.019
High level of stress exposure		25	80.7	39	95.1	P=0.024
Oral contraceptives use		6	19.4	14	34.2	NS
Irregular menstrual cycles		10	32.3	8	19.5	NS
Gynecological operations in medical history		3	9.7	5	12.2	NS

Table 3. Short Form-36 Health Survey among asthmatic and healthy women.

SF-36 domains	Asthmatic women			Healthy women			U Mann-Whitney test
	Mean ±SD	Min	Max	Mean ±SD	Min	Max	
General Health	50.81±20.00	10.00	85.00	54.51±20.24	0.00	85.00	NS
Health Change	50.00±20.41	0.00	100.00	49.63±17.30	0.00	100.00	NS
Physical Functioning	79.19±21.22	30.00	100.00	89.76±14.45	30.00	100.00	NS
Limitations due to Physical Health	59.68±32.71	0.00	100.00	79.88±31.73	0.00	100.00	P=0.003
Limitations due to Emotional Problems	63.19±32.73	0.00	100.00	77.93±33.12	0.00	100.00	P=0.047
Social Functioning	63.90±23.91	12.00	100.00	80.27±18.78	25.00	100.00	P=0.003
Pain	66.35±23.69	0.00	100.00	69.05±24.58	0.00	100.00	NS
Energy/Fatigue	46.77±19.43	20.00	80.00	57.68±14.49	25.00	85.00	P=0.018
Emotional Well-Being	48.26±27.30	8.00	92.00	62.44±19.16	8.00	88.00	P=0.033

SD – standard deviation

With respect to limitations due to physical health and limitations due to emotional problems, asthmatic women evaluated their current health state and mood as lower (59.68±32.71 and 63.19±32.73, respectively) in relation to the control group (79.88±31.73 and 77.93±33.12, respectively) (U Mann-Whitney test: P=0.003 and P=0.047) (*Table 3*). These women also showed more significant disorders in social functioning than healthy women (P=0.003) (*Table 3*). In the category: energy/fatigue, a global SF-36 score was significantly higher in the control group (57.68±14.49) in comparison with women with asthma (46.77±19.43; P=0.018). Moreover, the asthmatic women manifested significantly higher disorders in the emotional and psychological sphere in comparison with controls (P=0.033) (*Table 3*).

Based on a multiple regression model, a significantly negative effect of BMI on physical functioning (P=0.0019) and limitations due to physical health scores (P=0.048) was observed. Moreover, limitations due to emotional problems decreased along with regular occupational activity (P=0.04) and education level (P=0.022) in the whole study population. In the asthma group, limitations due to physical health increased along with cigarette smoking (P=0.03), and their current health state, compared with the last 12 months, deteriorated along with stress exposure (P=0.028). Also, a significant positive correlation was found between education level and current health state and mood (P=0.038).

Statistical analysis did not reveal any significant correlations between the severity, duration, and treatment of bronchial asthma and the quality of life parameters among studied women.

Sexual functioning of women

The comprehensive evaluation of the FSFI scale and its six collective domains (sexual desire, sexual arousal, lubrication, orgasm, sexual satisfaction and pain) showed that the asthmatic women display impaired sexual functioning as

Table 4. FSFI scale among asthmatic and healthy women.

FSFI domains	Asthmatic women			Healthy women			U Mann-Whitney test
	Mean ±SD	Min	Max	Mean ±SD	Min	Max	
FSFI – total score	25.96±9.14	3.60	35.10	29.90±5.17	10.40	36.00	NS
Sexual Desire	3.54±1.39	1.20	5.40	4.14±1.08	1.20	6.00	NS
Sexual Arousal	3.65±1.79	0.00	6.00	4.91±0.96	2.10	6.00	P=0.002
Lubrication	4.33±1.61	0.00	6.00	5.25±1.01	1.50	6.00	P=0.003
Orgasm	3.69±1.85	0.00	6.00	5.12±0.91	2.00	6.00	P=0.006
Sexual Satisfaction	3.88±1.74	1.20	6.00	5.18±1.01	1.60	6.00	P=0.002
Pain	4.52±1.68	0.00	6.00	5.29±0.91	2.00	6.00	P=0.048

SD – standard deviation

compared with the controls. The total FSFI scores revealed better sexual life in healthy women (29.90±5.17) in comparison with asthmatic patients (25.96±9.14), but they were not statistically significant (*Table 4*). In the category of: sexual arousal (P=0.002), lubrication (P=0.003), orgasm (P=0.006), sexual satisfaction (P=0.002), and pain domain (P=0.048), significant differences between the asthmatic and healthy women were also found, which confirmed lower sexual functioning in women with bronchial asthma (*Table 4*).

Implementing the cut-off point, clinical sexual dysfunctions prevailed in asthmatic women (25.8% *vs.* 17.1%). This relationship, however, was not statistically significant. Moreover, the duration of bronchial asthma negatively correlated with the quality of female sexual life (P=0.024). In the multiple regression model, no correlations between the other selected independent factors and sexual functioning were found in the groups studied.

DISCUSSION

Assessment of quality of life and sexual functioning performed in the present study revealed that women with bronchial asthma had lower quality of life parameters (limitations due to physical health and emotional problems, social functioning, energy/fatigue and emotional well-being) compared with healthy women. Asthmatic women also displayed worse sexual functioning in the category of: sexual arousal, lubrication, orgasm, sexual satisfaction and pain domain. Clinical sexual dysfunctions prevailed in asthmatic women, but they were not statistically significant. Independent factors directly connected with asthma (severity, duration and treatment of bronchial asthma) did not affect the quality of life. On the other hand, only the duration of bronchial asthma negatively correlated with female sexual life. The obtained results allow to state that bronchial asthma affects both general quality of life and sexual functioning of women.

Reviewing the available literature, one can find many studies that confirm the negative effect asthma has on patients' quality of life (2, 11-17).

Wyrwich et al (2), assessing the quality of life of 396 patients with bronchial asthma (SF-36 questionnaire), showed a subjective deterioration of the general well-being of both affected women and men. In the second part of the study, in which that assessment was verified by attending physicians, the results obtained - which were derived from patients – did not get confirmed, possibly due to inadequate physician-patient relationships (2). Ehrs et al (11) did not find any correlation between the quality of life of patients with bronchial asthma and the parameters which are directly linked with that condition. In the study by Larsson et al (12), the biggest disturbances in the quality of life affected women patients in older age brackets (50-64 years) as compared with men.

Our present results confirmed those of earlier studies. We found deterioration in women's general quality of life with respect to: limitations due to physical health and emotional problems, social functioning, energy/fatigue and emotional well-being. We also found the lack of impact of severity, duration, and therapy of bronchial asthma on the investigated parameters. But we did not find any effect of the age of the studied women on their quality of life.

Calfee et al (13), analyzing parameters of the quality of life in a cohort of 865 patients (Perceived Control of Asthma Questionnaire - PCAQ) in a prospective study (a median follow-up time of 1.9 years), showed a significantly positive effect of well-controlled asthma on: physical health status, asthma-related quality of life, and lower asthma severity scores. In another study, according to Archea et al (14), low socio-economic status and negative life events correlated with a lower quality of life of patients with bronchial asthma. For comparison, the present study confirmed a beneficial effect of education level on the current health status and mood of women treated for bronchial asthma, as compared with their status a year before, and fewer limitations due to emotional problems in the case of higher education and regular occupational activity.

Exacerbations of bronchial asthma, especially when it is chronic and moderate or severe, can correlate negatively and worsen affected patients' quality of life parameters, which was reflected in the studies by Lloyd et al (15) and Porsbjerg et al (16). Such relationships were not, however, confirmed by this study.

Body mass is one of the ontogenic risk factors for bronchial asthma development, but it can also impair the quality of life of patients with diagnosed asthma. In the study by Lavoie et al (17), a negative effect of BMI on the general well-being of studied men and women was verified. In the present study, a higher BMI also impaired the quality of selected life domains: physical functioning and limitations due to physical health.

Other studies (18, 19) indicate that mood disorders correlate with the quality of life of patients treated for bronchial asthma. In a study by Kullowatz et al (18), it was shown that the incidence of depression in asthma patients is quite frequent, which has a negative effect on quality of life, aggravates asthma symptoms, and increases the need for the use of glycocorticosteroids therapy and hospitalization of patients. Ekici et al (19) confirmed a significantly negative effect of depressive

mood disorders on the quality of life parameters and severity of bronchial asthma symptoms. Based on the above reports one can infer that the assessment of quality of life and mood disturbances should be one of clinical elements of the diagnostic and therapeutic diagram for managing patients with bronchial asthma (18, 19).

Bronchial asthma, as a chronic systemic disease, disturbs sexual functioning of women and men (3, 20). In a study by Meyer et al (3), which assessed the well-being and sexual life of 365 patients with bronchial asthma (228 women and 137 men), 58% of those studied declared sexual dysfunctions as one of the three biggest limitations caused by the illness. The authors identified significant risk factors for the incidence of sexual dysfunctions in bronchial asthma, which include: female gender (OR=1.6; 95% CI 1.0-2.7), chronic moderate/severe asthma (OR=2.5; 95% CI 1.5-4.2), age above 40 years (OR=2.7; 95% CI 1.6-4.3) and lower financial revenues (OR=2.0; 95% CI 1.1-3.6) (3). Walbroehl (20) in his study found a significant effect of age on the incidence of sexual life disorders in bronchial asthma – with the biggest number of disorders in patients' older age brackets.

The present study confirmed the impairment of sexual functioning of women with bronchial asthma. The frequency of clinically significant sexual dysfunctions was higher (25.8%), although not statistically significantly, compared with healthy women (17.1%). A significant risk factor in the incidence of sexual dysfunctions was the duration of bronchial asthma. Other clinical studies (21) also point out to different relationships – the incidence of bronchial asthma attacks after sexual intercourse. That could be explained by the occurrence of hypersensitivity to male semen or latex (21).

In conclusion, bronchial asthma decreases the quality of life with respect to: limitations due to physical health and emotional problems, social functioning, energy/fatigue, and in the emotional and psychological sphere among women. A negative effect of asthma on sexual functioning, particularly in the sexual arousal, lubrication, orgasm, sexual satisfaction and pain domain, is also observed.

REFERENCES

1. Światowa strategia rozpoznawania, leczenia i prewencji astmy. Aktualizacja 2006. [Global strategy for asthma management and prevention. Revised 2006.] (in Polish) *Medycyna Praktyczna*. Wydanie specjalne 2007; 1:31-41.
2. Wyrwich KW, Metz SM, Kroenke K, Tierney WM, Babu AN, Wolinsky FD. Interpreting quality-of-life data: methods for community consensus in asthma. *Ann Allergy Asthma Immunol* 2006; 96:826-833.
3. Meyer IH, Sternfels P, Fagan JK, Ford JG. Asthma-related limitations in sexual functioning: an important but neglected area of quality of life. *Am J Public Health* 2002; 92:770-772.
4. Ware JE, Kosinski M. SF-36 Physical and Mental Health Summary Scales: A Manual for Users of Version 1. 2nd edn. Lincoln, RI: QualityMetric Incorporated, 2001.

5. Ware JE, Kosinski M, Gandek BG et al. The Factor Structure of the SF-36 Health Survey in 10 Countries: Results from the International Quality of Life Assessment (IQOLA) Project. *J Clin Epidemiol* 1998; 51:1159-1165.
6. Turner-Bowker DM, Bartley PJ, Ware JE. SF-36 Health Survey and "SF" Bibliography. 3rd edn. Lincoln, RI: QualityMetric Incorporated, 2002.
7. Jenkinson C. The SF-36 physical and mental health summary measures: an example of how to interpret scores. *J Health Serv Res Policy* 1998; 3(2):92-96.
8. Rosen R, Brown C, Heinman J et al. The Female Sexual Function Index (FSFI): a multidimensional self-report instrument for the assessment of female sexual function. *J Sex Marital Ther* 2000; 26:191-208.
9. Meston CM. Validation of the Female Sexual Function Index (FSFI) in women with female orgasmic disorder and in women with hypoactive sexual desire disorder. *J Sex Marital Ther* 2003; 29:39-46.
10. Wiegel M, Meston C, Rosen R. The Female Sexual Function Index (FSFI): Cross-validation and development of clinical cut-off scores. *J Sex Marital Ther* 2005; 31:1-20.
11. Ehrs PO, Sundblad BM, Larsson K. Quality of life and inflammatory markers in mild asthma. *Chest* 2006; 129:624-631.
12. Larsson U, Taft C, Karlsson J, Sullivan M. Gender and age differences in the relative burden of rhinitis and asthma on health-related quality of life - A Swedish population study. *Respir Med* 2006; 102:727-730.
13. Calfee CS, Katz PP, Yelin EH, Iribarren C, Eisner MD. The influence of perceived control of asthma on health outcomes. *Chest* 2006; 130:1312-1318.
14. Archea C, Yen IH, Chen H et al. Negative life events and quality of life in adults with asthma. *Thorax* 2007; 62:139-146.
15. Lloyd A, Price D, Brown R. The impact of asthma exacerbations on health-related quality of life in moderate to severe asthma patients in the UK. *Prim Care Respir J* 2007; 16:22-27.
16. Porsbjerg C, Rasmussen L, Nolte H, Backer V. Association of airway hyperresponsiveness with reduced quality of life in patients with moderate to severe asthma. *Ann Allergy Asthma Immunol* 2007; 98:44-50.
17. Lavoie KL, Bacon SL, Labrecque M, Cartier A, Ditto B. Higher BMI is associated with worse asthma control and quality of life but not asthma severity. *Respir Med* 2006; 100:648-657.
18. Kullowatz A, Kanniess F, Dahme B, Magnussen H, Ritz T. Association of depression and anxiety with health care use and quality of life in asthma patients. *Respir Med* 2007; 101:638-644.
19. Ekici A, Ekici M, Kara T, Keles H, Kocyigit P. Negative mood and quality of life in patients with asthma. *Qual Life Res* 2006; 15:49-56.
20. Walbroehl GS. Sexual concerns of the patient with pulmonary disease. *Postgrad Med* 1992; 91:455-460.
21. Kuna P, Kupczyk M, Bochenska-Marciniak M. Severe asthma attacks after sexual intercourse. *Am J Respir Crit Care Med* 2004; 170:344-345.

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