Physiological and Hygienic Characteristics of Working Conditions in Textile Productions Uzbekistan

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Abstract

The intensive development of the textile industry in Uzbekistan, the employ-ment of a large contingent of women in it and the high morbidity observed among them raises the problem of the need to optimize working conditions and modes. In order to assess the impact of working conditions on the functional state of various systems of the body of women, complex physiological and hy-gienic studies were carried out at modern modernized textile industries. It has been established that they are characterized by dustiness of the air with cotton dust, increased noise level, insufficient and uneven illumination, unfavorable microclimate during the warm season, the severity and intensity of labor pro-cesses, which leads to the development of industrial fatigue in the dynamics of the working day, which manifests itself in a decrease in the mobility of nervous processes. in the central nervous system, weakening of the function of atten-tion, compensatory tension of the functional state of the cardiovascular sys-tem, in a decrease in muscle endurance and a decrease in the sensitivity thresh-old of the visual analyzer. To stabilize the indicators of the functional state of various body systems of workers, to maintain a high level of working capacity and labor productivity, it is necessary to introduce measures to minimize the harmful effects of production factors, to rationalize work and rest regimes, and to take preventive measures.

Keywords: *working conditions, textile production, women, functional state of the body.*

Introduction

The textile industry is successfully developing in Uzbekistan. The constantly growing demand both in the domestic and foreign markets for textile products and the high labor intensity of production make it possible to provide em-ployment for a large number of the population, primarily women in rural are-as, and testifies to the social orientation of the industry [1].

The intensive development of textile industries, the creation of joint ventures

equipped with new imported equipment, the introduction of new modern tech-nologies, leads to a change in working conditions at textile enterprises, to an increase in intensity, neuro-emotional tension and intelligence of labor process-es, which significantly expands the range of issues in terms of hygiene and physiology of labor of women employed in this branch of production. The levels of parameters characterizing production factors (dustiness and gas con-tamination of the air of the working area with harmful substances, noise, vibra-tion, unfavorable microclimate, insufficient illumination, severity and intensity of labor processes) also change, which creates additional requirements for the body of women in the course of their work.

The main result and findings

The high level of morbidity among women employed in the textile industry, common gynecological pathology, pathology of pregnancy and childbirth, premature aging of the body poses a problem for hygienists to address the is-sues of optimizing the working conditions and modes of work of women work-ing in the textile industry, reducing the severity and intensity of labor process-es, which in Ultimately, it will serve to preserve the health of a huge contin-gent of women and their offspring [7]. The problem of occupational health and protection of women's health in the scientific literature is given quite a lot of attention. Publications [2,3,4,5,7,13,15,16,17,18] indicate that the accumu-lated data on the adverse effects of production factors on the body of women and offspring substantiate the need to develop and implement a set of measures aimed at improving working conditions for women.

Purpose of research. to evaluate the working conditions of modern textile in-dustries and their influence on the dynamics of the functional state of various body systems of workers.

Material and research methods. The working conditions of textile industries were studied by traditional methods using an aspirator, psychrometer, ane-mometer, sound level meter, light meter in accordance with the requirements of the Sanitary Rules, Norms and Hygienic Standards of the Republic of Uzbeki-stan No. 0294-11 [8], 0325-16[9], 0141-03 [10], 0324-16 [11], building codes and regulations 2.01.05-96 [19].

The physiological reactions of the organism (using the example of weavers) were studied in the spring and summer seasons of the year in the following or-der: before starting work, the initial, background characteristics of the indica-tors of the functional state of various body systems were recorded, and at the end of the shift, physiological reactions developing during the working day. To assess changes in the central nervous system, the speed of the visual-motor reaction (VMR) was determined using a chronoreflexometer apparatus. The functional state of the visual analyzer was assessed in terms of the critical fre-quency of fusion of light flickers on the apparatus KChSM-80. The function of attention was studied using proofreading tables with a regulated text. Indi-cators of the cardiovascular system were studied by palpation counting of the pulse rate and sound measurement of blood pressure, followed by calculation of pulse pressure, systolic and minute blood volumes, mean dynamic pressure and peripheral resistance in the capillaries [14], the state of the neuromuscular system - according to physiological tremor and muscle endurance. The studies were carried out at the Tashkent textile industries of JV "Boiteks" and JV "Tashteks".

Research results. Air sampling for dust content showed that its content in various working areas ranged from 4.8 to 7.8 mg/m3 m3 (MAC for cotton dust - 4.0 mg/m3), that is, in all surveyed areas there is an increased dust content of the air (table 1).

Table 1. Indicators of dust content in the air at the main workplaces of textile industries.

Workplaces	Dust concentration mg/m^3	
	n	M±m
Card operator	24	7,0±0,1
Spinner	24	7,8±0,2
Winder	20	5,4±0,1
Weaver	25	5,7±0,5
Quality controller	20	4,8±0,6

The air temperature of production sites fluctuated in the spring from 28.8±0.2 to 31.6±0.50C, with a relative humidity of 48.2±0.3 - 72.2±0.9% and a mobili-ty of 0.3 - 0.6 m/s In the warm period of the year (Table 2), the average shift air temperature ranged from 33.4 to 34.20C, with a relative humidity of 42.3 - 55.6% and a mobility of 0.2-0.5 m/sec.

Table 2. Average shift indicators of the microclimate of the main production sites of textile industries in the summer period of observations

Site names	Microclimate indicators					
	Air temperature in ^{0}C		Relative humidity in %		Air movement in m/sec	
	n	M±м	n	M±м	n	M±м
Carded	52	33,4±0,4	52	42,3±1,2	16	0,2±0,08
Spinning	52	34,0±0,6	52	49,5±1,4	16	0,2±0,04
Winding	48	34,2±0,5	52	51,4±1,5	16	0,4±0,02
Weaving	48	34,0±0,7	48	55,6±1,4	14	0,5±0,02
Control	48	33,8±0,6	48	53,3±1,6	14	0,5±0,04

The production equipment of textile industries generates noise at workplaces, which is of a constant nature, belongs to the medium-frequency class (Table 3), the general level of which at various workplaces exceeds the maximum permis-sible level from 4 to 14.

Table 3. Noise indicators at the main production sites of textile industries

Site names	Noise level in octave bands of geometric mean frequencies								Overall noise level
	65	125	250	500	1000	2000	4000	8000	
Carded	70	76	78	83	82	80	76	70	87
Spinning	71	76	79	84	83	80	76	71	88
Winding	70	76	78	80	79	76	73	69	84
Weaving shuttle. machine									
Shuttle.machine	71	76	78	90	80	76	81	70	85
Quality controller	71	82	88	86	89	84	76	71	94
	72	78	82	84	84	80	76	72	89

Illumination of workplaces in textile industries is uneven and insufficient (Ta-ble 4), does not comply with hygienic regulations.

Table 4. Illumination indicators in the main production areas of textile indus-tries

Site names	Illumination indicators			
	Illumination of work surfaces lk		Daylight factor in %	
	n	M±m	n	M±m
1.Carded	80	200±5,5	80	0,7±0,1
2.Spinning	60	170±8,2	60	0,4±0,1
3.Winding	90	30±4,8	90	0,07±0,04
4.Weaving	60	130±7,5	60	0,3±0,1
5.Quality controller	60	50±4,4	60	0,1±0,05

The nature of labor processes is characterized by severity and tension. The se-verity of the labor process of all professional groups is associated with the need to perform body inclinations more than 300 to 100 times per shift, 80% of the shift work in a "standing" position. The intensity of the labor process is due to the duration of focusing more than 75% of the shift time, the monotony of the performance of labor operations.

Consequently, in the process of labor activity, textile workers are exposed to the adverse effects of air dustiness with cotton dust, increased noise levels, in-sufficient and uneven lighting, unfavorable microclimate during the warm sea-son, the severity and intensity of labor processes,

The most widespread profession of textile production is the profession of a weaver, in connection with which the study of the influence of working condi-tions on the dynamics of the indicators of various body systems of working women was carried out on the example of weavers, especially since the work-ing conditions of women of other professional groups are characterized by the same unfavorable production factors. Practically healthy weavers aged 18 to 40 years, with work experience from 1 to 20 years, were examined, 50 man-days of observation were carried out.

The conducted studies have shown that in the spring period of observations from the beginning to the end of work, the number of heartbeats in weavers in-creases by an average of 21.6%, there is an increase in both the maximum and minimum blood pressure, respectively, by 14.1 and 21.6%, significantly the pulse pressure increases by 4.0%, the average dynamic pressure by 18.4%, there is a tendency to decrease both systolic and cardiac output, an increase in peripheral resistance in the capillaries (Table 5). Consequently, under condi-tions of optimal air temperatures from the side of the cardiovascular system, reactions developed that testify to compensatory tension of a hypertensive na-ture. In the summer period of observation from the beginning to the end of the shift, there was a significant increase in heart rate by 22.7%, a decrease in max-imum pressure by 10%, an increase in the minimum by 11.2% and pulse arte-rial pressure by 44.6%, a decrease in systolic by 28.8% and minute volume of the heart by 13%, an increase in peripheral resistance in the capillaries by 17.6%.

Analysis of the obtained data shows that the labor process of weavers per-formed at elevated air temperatures at workplaces in the summer period of the year causes a significant weakening of the functional reserves of the cardiovas-cular system, the development of adverse changes in hemodynamic parameters in the dynamics of work, which may cause the development of pathological changes [20] .

From the side of the central nervous system, during the working day, the ex-amined weavers developed a predominance of inhibitory processes, a weaken-ing of sequential inhibition and an increase in errors to a

differentiating stimu-lus, and at elevated air temperatures at workplaces in the summer season, changes in the indicators of simple and complex visual-motor reactions were more pronounced and significantly exceeded the maximum - permissible values of physiological changes.

Table 5. Indicators of the dynamics of physiological reactions of weavers in the spring period of observations

Indicators of physiological reactions	At the start of work	At the end of work	Reliability	
	M± m	M ±m	t	$p<_{2-3}$
1	2	3	4	5
Pulse (bl. in min)	71,7±0,9	87,2±0,9	9,4	0,001
Arterial pressure (mm rt.st.) - maximum - minimal - pulse -medium-dynamic	 110,6±4,5 69,7±.2.5 46,8±1,5 78,0±2,3	 126,2±3,5 77,5±2,0 48,7±3,0 92,4±2,5	 2,73 2,73 0,42 4,24	 0,05 0,001 - 0,001
Systolic volume of the heart(ml)	65,0±4,5	62,2±3,7	0,3	-
Minute volume of the heart (ml)	5019,6±329,3	4862,6±292,7	0,5	-
Peripheral resistance in capillaries (dyn)	1271±36,6	1458,6±47,5	3,12	0,01
Time simple ZMD (in ml sec)	279±4,1	293±4,2	3,3	0,001
Time serial ZMD (in mlsec)	322±2,1	341±6,1	3,4	0,001
Number of errors per differentiation (%)	5,7±0,8	6,6±0,5	1,96	0,05
Muscle endurance (sec)	46,6±1,2	42,1±1,6	2,2	0,05
Thermometry: - number of touches -task execution time (sec)	 13,9±1,2 11,6±0,8	 16,7±1,3 13,2±0,7	 1,2 1,1	 - -
Critical flicker fusion frequency (Hz)	26,5±0,1	24,0±0,4	2,4	0,05
Weighted mean skin temperature (^{0}C)	32,3±0,9	33,0±0,7	0,53	-
Electroskin resistance (con.)	12,6±1,8	44,8±5,1	5,9	00,1
Warm feeling (in points)	4,0±0,1	5,0±0,2	5,0	00,1

From the beginning to the end of the working day, weavers' muscular endur-ance decreases: in the spring period of observations, muscle endurance de-creased by 7.8%, in the summer period - by 27.8%, which exceeds the physio-logical standards of the maximum permissible value of the body's physical stress during labor. It is noteworthy that in the summer period of observa-tions, already the background level of muscle endurance before working in the same weavers was lower by 17%, during the working shift it decreased even more, which was accompanied by a significant increase in tremor of the hands and the time to complete the task on the thermometer.

Table 6. Indicators of the dynamics of physiological reactions of weavers in the summer period of observations

Indicators of physiological reactions	At the start of work	At the end of work	Authenticity	
	M± m	M ±m	t	$p<_{2-3}$
1	2	3	4	5
Pulse (bl. In min)	72,0±1,8	88,4±1,8	6,45	0,001
Arterial pressure (mm rt.st.) - maximum - minimal - pulse -medium-dynamic	 112,0±2,2 70,5±1,6 42,2±1,4 84,2±2,1	 101,0±2,0 78,4±1,4 23,4±1,6 86,2±1,9	 3,56 3,86 8,86 0,7	 0,01 0,001 0,001 -
	62,2±2,3	44,3±2,0	6,01	0,001
Systolic volume of the heart(ml)	4507,2±35,4	3923,0±30,6	12,2	0,001
Peripheral resistance in capillaries (dyn)	1494,1±23,4	1757,3±27,7	7,26	0,001
Time simple ZMD (in mlsec)	259±2,3	283±2,1	3,8	0,001
Time serial ZMD (in mlsec)	368±2,1	378±2,2	3,69	0,001
Number of errors per differentiation (%)	10,4±0,5	15,5±0,5	2,1	0,05
Muscle endurance (sec)	39,8±1,2	28,7±1,4	3,5	0,001
Thermometry: - number of touches -task execution time (sec)	 13,5±1,4 10,4±0,3	 19,2±1,2 14,5±0,3	 2,8 2,3	 0,01 0,05
Critical flicker fusion frequency (Hz)	28,8±0,4	23,1±0,5	2,8	0,01
Weighted mean skin temperature (^{0}C)	34,4±0,4	35,8±0,4	4,68	0,001
Electroskin resistance (con.)	17,7±2,7	64,4±7,2	6,07	0,001
Warm feeling (in points)	4,0±0,1	7,0±0,1	4,38	0,001

Research materials also show that the work of weavers causes a significant de-crease in the sensitivity threshold of the visual analyzer, which is more pro-nounced when working in conditions of high air temperature in workplaces in the summer.

In the summer period, in the dynamics of work, a significant tension in ther-moregulation was revealed, manifested in a violation of heat transfer, ineffi-cient sweating, an increase in the temperature of the skin, and a deterioration in the subjective assessment of the thermal state.

The change in the indicators of the functional state of various body systems was accompanied by a significant decrease in working capacity and a deterio-ration in the psycho-emotional state of workers.

To stabilize the indicators of the functional state of various body systems of workers, to maintain a high level of working capacity and labor productivity, it is necessary to introduce measures to minimize the harmful effects of produc-tion factors, to rationalize work and rest regimes, and to take preventive measures.

Conclusions

1. The main unfavorable production factors of textile industries are dust, noise, insufficient, uneven illumination, high temperature and relative humidity in the warm season, the severity and intensity of the labor process.

2. In the spring period of the year, production fatigue of workers manifests it-self in a decrease in the mobility of nervous processes, a weakening of differen-tiation and attention function, an increase in sequential inhibition, a compensa-tory stress on the functional state of the cardiovascular system, which is of a hypertensive nature, in a decrease in muscle endurance and the sensitivity threshold of the visual analyzer.

3. In the summer season, at elevated air temperatures and relative humidity at workplaces, the severity of physiological changes and work fatigue increase, which is manifested in a significant weakening of the functional reserves of the cardiovascular system, the predominance of inhibitory processes in the central nervous system, changes in the performance of the neuromuscular system and visual analyzer, which exceed the maximum - permissible values of physio-logical changes and is accompanied by a significant tension in thermoregula-tion.

4. To reduce the fatigue of the labor process of textile workers and stabilize the indicators of the functional state of the body, it is necessary to introduce recommendations for improving working conditions.

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