WORKING ACTIVITY HYGIENE, CENTRAL NERVOUS SYSTEM AND ATTENTION FUNCTION PARAMETERS OF THE WORKING FEMALES AT KNITTING ENTERPRISES OF UZBEKISTAN

Last years in Uzbekistan the knitted manufactures have developed intensively, supplied with the new equipment and modern technologies which result in change of working conditions at the knitted-goods enterprises, in increase of intensity, strained nervous-emotional state and intellectuality of working processes. The study purpose was to reveal influence of working conditions of the working women of knitted manufactures on dynamics of working activity, on the central nervous system and functions of attention. The healthy working women of the Tashkent knitted manufactures making a knitted cloth and wears (knitters, seamstresses, ironers) at the age from 20 till 40 years with the operational experience from 2 till 20 years were enrolled in this study. It was established that of all unfavourable factors that effect on the reduction of the working activity the air dust contamination accounts for 13.6%, noise 13.6% and light exposure of workplace 32.4%. For decrease of a functional strain of the central nervous system and function of attention of the working women it is necessary to introduce the rational mode of work and rest as well as measures for improvement of working conditions.

Keywords: Knitting enterprises, women, working conditions, working activity, dynamics of functional state of the central nervous system, function of attention, higher air temperature

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Introduction

The enormous opportunities of the raw base of Uzbekistan (cotton) create favorable conditions for development of manufactures of natural fibers, which are used in the knitted manufacture, where the women work in the main. Last years in Uzbekistan the knitted manufactures have developed intensively, supplied with the new equipment and modern technologies which result in change of working conditions at the knitted-goods enterprises, in increase of intensity, strained nervous-emotional state and intellectuality of working processes.

The researches which have been carried out at the textile and knitted manufactures in the various countries, show that the complex of the adverse industrial factors concerns to features of working conditions on these manufactures: a dust content and microbial dissemination of the air of working zones, noise, unfavourable microclimate, intensive character of working process (Demirova, 1977; Ikonomova, Chipileka, Kruleva, and Anastasova, 1989; Samigova, 2002, 2005; Khashirbaeva, 2004, 2008; Slavinskaya, Medvedeva, Ochilov, and Iskandarov, 2006; Oliveira, Monteiro, Ribeiro, Pignatelli, and Aguas, 2009). According to the data of Biclea, Manole, Oanca, Matei, and Tamas (2009) the dust, noise, muscular and psychoemotional strain, high visual loading are the risk factors for development of diseases due to occupational conditions on the textile and knitted manufactures. There are data that a level of morbidity of the working women on the textile manufactures located under conditions of a hot climate is higher significantly, than in other districts (Singh, Fotedar and Lakshminarayana, 2005).
The working processes and features of working operations on the knitted manufactures described by a constant concentration of attention, performance of monotonous movements at a static tension of muscles of hands, monotony of working environment, can be reflected in a functional conditions and systems of the body of the working women, and the most expressed changes may be expected in those systems, which take direct participation in this work. Therefore it is necessary to pay the special attention on dynamics of the state of the central nervous system and functions of attention.

The purpose of study was to reveal influence of working conditions of the women from knitted manufactures on the dynamics of working activity and on the central nervous system and functions of attention at the higher temperatures of the ambient air of a working zone.

Materials and methods

The working conditions of the women of the knitted manufactures were studied by traditional methods with use of psychometer, anemometer, noise meter, and aspirator. The state of working activity was estimated by time required for performance of one working operation, and by change of this parameter from the beginning by the end of shift. The functional state of the central nervous system was studied at optimum temperatures of air (spring period of observations) and at the increased temperatures (summer period of observation) by dynamics of the simple and complex visual and audio-motor reactions, and function of attention by parameters of correcting test. The healthy working women of the Tashkent knitted manufactures making a knitted cloth and wears (knitters, seamstresses, ironers) at the age from 20 till 40 years with the experience of job from 2 till 20 years were enrolled in this study.

All the working women were informed about investigations and gave the informed consent for participation in this study.

The researches are carried out in the spring period of year, when temperature of air on workplaces was optimum (23-24°C), and in the summer period at increased temperature (31.5-34.6°C) at relative humidity 35-42 % and mobility 0.5-0.8 м/с.

Results and discussion

The study of working conditions on knitted manufactures has shown that the concentration of cotton dust at workplaces of knitters was 4.2±0.2 мг/м³, on the sewing sites the level of dust content was, on the average, 0.75±0.02 мг/м³, on the ironing sites the dust level was normal.

It was also established, that at the modern knitted manufactures in the knitted departments the working knitted machines generated the high-frequency noise, and with increase of a diameter of a knitted cloth the noise level increased. The knitted machines making a knitted cloth of the diameter 14, are a source of noise in 85 dBA, of the 32-d diameter - 106 dBA. On the other industrial sites presence of industrial noise exceeding the allowable level on 1-3 dBA is also ascertained.

At the sewing sites the seamstresses are exposed to influence of general industrial noise up to 81 dB, and, besides, to the effect of the common low-frequency vibration registered on a cover of sewing tables, which exceeds norms on 1-2 dB in relation to vibrovelocity.

Light exposure of workplaces is uneven and insufficient, below the hygienic specifications.

The results of dynamic study of working activity of knitters, seamstresses, and ironers are presented in the Figure 1.

The data received show that in the women working at knitted manufactures the classical dynamics of change of working activity was observed (Vinogradov, 1969): its significant increase on the second hour of working shift and sharp reduction both in first, and in
second semi-shifts, that is explained by intensification of working process with following subsequent developing working exhaustion. There is established regularity of correlation between decrease in working ability and the level of air dust content ($r=0.64$), the noise level ($r=0.63$) and the level of light exposure ($r=0.79$). The calculation of parameters for determination showed out of all unfavourable factors that affect on the reduction of the working activity the air dust contamination accounts for 13.6%, noise 13.6% and light exposure of workplace 32.4%.

The data received have been used for development of the recommendations for improvement of working regimes for the women at the knitting factories of the Republic of Uzbekistan with addition of two regulated ten-minute breaks after the third and sixth hour of the working shift.

The analysis of materials of study on the functional state of the central nervous system and function of attention of the women of the basic professional groups of knitting manufactures showed that working conditions and the character of labour processes causes development of prevalence of the inhibiting processes in the central nervous system of the working women.

The studies showed that the time of the latent period of the simple visual - motor reaction in the working women within a working day under the conditions of optimum temperatures of the spring period of observation grows, on the average, by 6.3 % ($p<0.001$) (table 1). In the summer period of observation the character of change of the latent period of the visual - motor reaction is similar as the data of the spring period of observation, however, intensity of the shifts is more significant (by 19 %), that indicates about marked fatigue.

From the beginning to the end of working shift the percent of erroneous responses to the differentiating stimulus in the spring period increased from 5.7±0.8 up to 6.6±0.5 %, and in the summer period from 10±0.5 up to 15.5±0.5 % is increased.

In the dynamics of a working day there was also revealed development of inhibiting processes on the parameters of acoustic - motor reaction, and more expressed shifts were noted in the knitters, on which workplaces there were found higher levels of noise, in comparison with other professional groups.
### TABLE 1. DYNAMICS OF CHARACTERISTICS OF SIMPLE SENSORIMOTOR REACTIONS IN THE WORKING WOMEN OF KNITTING ENTERPRISES (M±M, ml/sec)

<table>
<thead>
<tr>
<th>Profession</th>
<th>At the onset of working shift</th>
<th>Before the dinner break</th>
<th>At the end of working shift</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Light</td>
<td>Noise</td>
<td>Light</td>
</tr>
<tr>
<td>Knitters</td>
<td>307.1±0.12</td>
<td>261.0±0.19</td>
<td>322.5±0.14</td>
</tr>
<tr>
<td>Seamstresses</td>
<td>278.9±0.12</td>
<td>237.1±0.15</td>
<td>285.9±0.13</td>
</tr>
<tr>
<td>Ironers</td>
<td>325.8±0.16</td>
<td>277.9±0.15</td>
<td>337.5±0.14</td>
</tr>
</tbody>
</table>

**Spring period**

| Knitters   | 248.1±0.12 | 196.3±0.15 | 289.6±0.13 | 238.3±0.18 | 336.8±0.11 | 290.0±0.21 |
| Seamstresses | 259.1±0.9 | 209.5±0.27 | 288.8±0.12 | 238.5±0.17 | 295.9±0.07 | 240.6±0.16 |
| Ironers    | 296.1±0.13 | 246.8±0.19 | 320.3±0.12 | 273.7±0.14 | 331.8±0.28 | 282.7±0.16 |

**Summer period**

Besides in dynamics of job the parameters describing function of attention of the working women were worsened: the quantity of mistakes occurred at performance of the correcting test and time for performance of the task were increased. In the summer period of observation the quality of performance of correcting test is worsened, that indicates about more marked industrial fatigue (Table 2).

### TABLE 2. CHANGES OF THE CORRECTING TEST FINDINGS IN THE WORKING WOMEN OF THE KNITTING ENTERPRISES IN THE SPRING AND SUMMER PERIOD OF OBSERVATION

<table>
<thead>
<tr>
<th>Findings of the correcting test</th>
<th>At the onset of working shift</th>
<th>Before dinner break</th>
<th>At the end of working shift</th>
<th>Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M±m</td>
<td>M±m</td>
<td>M±m</td>
<td>p&lt;1-3</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td><strong>Spring period</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time for performance of the task (sec)</td>
<td>62.3±1.2</td>
<td>65.1±1.1</td>
<td>69.1±1.3</td>
<td>0.001</td>
</tr>
<tr>
<td>Number of mistakes</td>
<td>1.1±0.1</td>
<td>1.6±0.2</td>
<td>2.0±0.1</td>
<td>0.001</td>
</tr>
<tr>
<td><strong>Summer period</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time for performance of the task (sec)</td>
<td>68.8±0.9</td>
<td>69.5±0.5</td>
<td>71.8±1.0</td>
<td>0.05</td>
</tr>
<tr>
<td>Number of mistakes</td>
<td>1.1±0.03</td>
<td>1.6±0.1</td>
<td>2.6±0.1</td>
<td>0.001</td>
</tr>
</tbody>
</table>

The high correlation was revealed between dependence of change of the parameters of the central nervous system on the noise (r=0.89-0.99), on the light exposure (r=0.96-0.99) and on the temperature of air (r=0.99).

The results of investigations show that the working conditions and character of work at the modern knitting factories fall short of the hygienic norms and result in unfavorable effect on the central nervous system and attention function of the working women.

The working females were found changes in the central nervous system and attention state which were connected with their working activity under the conditions of optimal air temperature. Of them the most common is reduction of velocity of sensory-motor reactions, increase in erroneous responses to differentiated stimulus and mistakes during performance of the correcting test that indicates about development of inhibiting processes and shows the fatigue.

In warm climatic period when the temperature of the ambient air at the working places increases significantly due to effect of high temperature of the environment the changes in
the parameters of central nervous system and attention function become more intensive to the end of the working shift, that is, exhausting effect of working process increases.

Taking into account that the working processes remain to be unchanged both at optimal and higher temperature it may be stated that the changes revealed are connected with effect of the temperature factor.

The materials of researches have been used during development of the hygienic recommendations “Rationalization of modes of work and rest of the women working at the knitting enterprises of Uzbekistan” and methodical recommendations “Improvement of the working conditions for females at the knitting enterprises,” which introduction into a number the knitting factories has given positive results: in the working women the parameters of the central nervous system and functions of attention have been stabilized, the level of working activity has raised.

Conclusion

During a working day in the women working at knitting manufactures, the prevalence of inhibiting processes develops, that expresses in reduction of the velocity of sensory-motor reactions and increase of erroneous responses to differential stimulus, and at the higher temperatures of air at the working places in the summer period of year the changes are more marked.

During the working process the parameters characterizing function of attention of the working women are worsened: the quantity of mistakes made at performance of the correcting test increased, the time required for performance of the task increased too. In the summer period of observation the quality of performance of correcting test is worsened, that indicates more marked occupational weakness.

For decrease of a functional strain of the central nervous system and function of attention of the working women it is necessary to introduce the rational mode of work and rest as well as measures for improvement of working conditions.

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