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Particularities of the clinical current of chronic gingivitis, conditioned stress-induce influence of disadvantage factors aircraft flight

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Abstract
AIM. To study particularities of the clinical current of chronic gingivitis beside flying personnel and employee of the overland service of civil aviation.
MATERIALS AND METHODS. With using of clinical and x-ray methods examined parodontology status beside 42 flying personnel and 45 employees of the overland service of civil aviation. Beside flying personnel and employee of the overland service were formed 4 groups: I group – a flying personnel with parodontal pathology, 25 pers.); II – an employees of the overland service of civil aviation with parodontal pathology (28 pers); III – 17 persons of the flying composition of civil aviation with sound condition of parodont; IV group – 17 employees of the overland service of the airport with sound condition of parodont. For objective estimation of parodontal status were used hygienic indexes.
RESULTS. Inflammatory process heavy degree of gravity in marginal parodont the most expressing beside flying personnel, degree these transformations most distinctly reveals itself in hemomicrocirculation riverbed of parodont and depends as from type provoking factor of the aircraft flight, so and from sensitivity organ and tissues of oral cavity to influence these disadvantage factor.
CONCLUSION. The most sensitive to disadvantage factor aircraft flight (noise, hypoxia swings of the barometric pressure, vibration and hypergravity) is microcirculation riverbed of parodontal structures.

Keywords: perrodont, cabine staff, gingivitis, civil aviation, overland service, air worker

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Особенности клинического течения хронического гингивита, обусловленного стресс-индуцирующим влиянием неблагоприятных факторов авиационного полёта

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Резюме
ЦЕЛЬ. Изучить особенности клинического течения хронического гингивита у лётного персонала и сотрудников наземной службы гражданской авиации.
МАТЕРИАЛЫ И МЕТОДЫ. С использованием клинико-рентгенологического метода обследован пародонтологический статус у 42 лётного персонала и 45 сотрудников наземной службы гражданской авиации. У лётного персонала и сотрудников наземной службы были сформированы 4 группы: I группа – лётный персонал с патологией пародонта, 25 человек); II – сотрудники наземной службы гражданской авиации с патологией пародонта (28 человек); III – 17 человек лётного состава гражданской авиации с интактным состоянием пародонта; IV группа – 17 сотрудников наземной службы аэропорта с интактным состоянием пародонта. Для объективной оценки пародонтологического статуса использовались гигиенические индексы.
РЕЗУЛЬТАТЫ Воспалительный процесс тяжелой степени тяжести в краевом пародонте наиболее выражен у лётного персонала, выраженность этих преобразований наиболее отчетливо проявляется в гемомикроциркуляторном русле пародонта и зависит как от вида провоцирующего фактора авиационного полета, так и от чувствительности органов и тканей полости рта к воздействию этих неблагоприятных факторов.
ВЫВОД. Наиболее чувствительными к неблагоприятным факторам авиационного полёта (шум, гипоксия, перепады барометрического давления, вибрация и гипервесомость) является микроциркуляторное русло пародонтальных структур.

Ключевые слова: пародонт, лётный персонал, гингивит, гражданская авиация, наземная служба, авиаработник

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INTRODUCTION

The high prevalence of periodontal diseases necessitates the search for optimal means, methods of prevention and treatment taking into account the pathogenetic mechanisms of their development [1–3].There is a close relationship between periodontal pathology and general diseases of the body, a special place among which are diseases of the digestive and circulatory systems, respiratory and blood organs, endocrine and genitourinary system [4; 5], which is due to the commonality of the main links of pathogenesis.

At the same time, in recent years, there are practically no studies on the peculiarities of the development of chronic gingivitis in civil aviation employees in our country. It is relevant to study the structure of chronic gingivitis, which has not been carried out in flight personnel and employees of the ground service of civil aviation. The dominant flight-associated pathogenetic factors at different severity of chronic gingivitis in flight personnel, determining the choice of adequate treatment and prophylactic action, have not been established.

Improving the quality of life of the dental aspect of health in flight personnel is an extremely urgent problem and is related to flight safety. Professional activity of flight personnel, performed day in and day out under conditions of stress-inducing factors of aviation flight (hypergravity, vibration, altered barometric pressure, noises, etc.) leads to a significant decrease in the quality of the dental aspect of health and development of dysregulation of the functional capacity of organs, tissues and environment of the oral cavity. Such conditions create potential opportunities for the development of dental diseases and their chronicization.

Based on the above, determines as a priority further studies of the peculiarities of the clinical course of chronic gingivitis due to stress-inducing influence of unfavorable factors of aviation flight in civil aviation employees.

AIM

Aim is to study the peculiarities of the clinical course of chronic gingivitis in flight personnel and employees of civil aviation ground service.

MATERIALS AND METHODS

The study was conducted at the Medical and Sanitary Unit of the International Airport of Dushanbe. Periodontal status of 42 flight personnel and 45 employees of civil aviation ground service aged 22 to 65 years were examined using clinical and radiologic methods. Four groups were formed in flight personnel and ground service employees: Group I – flight personnel with periodontal pathology, 25 people); Group II – civil aviation ground service employees with periodontal pathology (28 people); Group III – 17 civil aviation flight personnel with intact periodontal status (1 control group); Group IV – 17 airport ground service employees with intact periodontal status (2 control group).

The following indices were used for objective assessment of periodontal status: papillary-marginal-alveolar index (PMA index in Parma modification); bleeding index (BI) in points; Fedorov-Volodkina hygiene index in points; Green-Vermillion index for characterization of dental deposits in points; Silnes-Lowe index for detection of dental plaque thickness in points.

The results of the study were analyzed using parametric (Student, Mann-Whitney, Fisher's criterion) and non-parametric criteria (Spearman correlation analysis). Differences were considered reliable at $p < 0.05$. All calculations were performed using the Statistica 7.0 software package.

RESULTS

The average data of dental indices of chronic inflammation of the marginal periodontium and hygienic condition of the oral cavity in the examined groups of airplane workers are shown in Table 1. As follows from the table, the value of papillary-marginal-alveolar index in groups I and II of aviation workers amounted to 32.2 ± 1.8 % and 18.5 ± 0.7 %, respectively, with flight personnel having a significantly higher index (1.7 times) compared to ground service workers ($p < 0.01$). In groups III and IV of aviation workers, the value of the above-mentioned index was equal to zero. The value of bleeding index was not recorded in groups III and IV of flight and ground service workers, with maximum score in patients of group I (2.13 ± 0.22) and group II (1.21 ± 0.24).

As for Fedorov-Volodkina, Green-Vermillion and Silnes-Low indices, they are determined in all groups of the examined, including flight personnel with intact condition of the marginal periodontium (group III) and civil aviation ground service employees without pathologic condition in the marginal periodontium (group IV). The values of these indices significantly decrease from group I to group IV of aviation workers with corresponding values of 2.83 ± 0.05, 2.25 ± 0.05, 1.92 ± 0.07 and 1.56 ± 0.06 points for Fedorov-Volodkina index, 1.64 ± 0.05, 1.03 ± 0.07, 0.85 ± 0.07 and 0.52 ± 0.05 points for the Green-Vermillion index, with corresponding values of 1.75 ± 0.14, 1.13 ± 0.10, 0.27 ± 0.04 and 0.17 ± 0.05 points for the Silnes-Low index. The highest values of these indices were found in the flight crew of aviation workers of group I with periodontal pathology.

We also studied the incidence of severe chronic gingivitis among the examined contingent of airline workers (Table 2).

Table 1. Source importance of the hygienic factors amongst workman of the civil aviation

Таблица 1. Исходные значения гигиенических показателей среди работников гражданской авиации

No.	Hygienic indicators	Groups of surveyed airline workers (*n* = 87)			
		I Group (*n* = 25)	II Group (*n* = 28)	III Group (*n* = 17)	IV Group (*n* = 17)
1.	Papillary-marginal-alveolar index, %	32.2 ± 1.8	18.5 ± 0.7	0	0
	p	I–II < 0.01; I–III < 0.01; I–IV < 0.01; II–III < 0.01; II–IV < 0.01; III–IV > 0.05			
2.	Bleeding index, points	2.13 ± 0,22	1.21 ± 0.24	0	0
	p	I–II < 0.01; I–III < 0.01; I–IV < 0.01; II–III < 0.01; II–IV < 0.01; III–IV > 0.05			
3.	Fedorov-Volodkina index, scores	2.83 ± 0.05	2.25 ± 0.05	1.92 ± 0.07	1.56 ± 0.06
	p	I–II < 0.01; I–III < 0.01; I–IV < 0.01; II–III < 0.01; II–IV < 0.01; III–IV < 0,05			
4.	Green-Vermillion index, scores	1.64 ± 0.05	1.03 ± 0.07	0.85 ± 0.07	0.52 ± 0.05
	p	I–II < 0.01; I–III < 0.01; I–IV < 0.01; II–III < 0.01; II–IV < 0.01; III–IV < 0,05			
5.	Silnes-Lowe index, scores	1.75 ± 0.14	1.13 ± 0.10	0.27 ± 0.04	0.17 ± 0.05
	p	I–II < 0.01; I–III < 0.01; I–IV < 0.01; II–III < 0.01; II–IV < 0.01; III–IV > 0.05			

Table 2. Frequency of the discovery of chronic gingivitis heavy degree amongst aircraft workman (%)

Таблица 2. Частота встречаемости хронического гингивита тяжелой степени среди авиаработников (%)

No.	Hygienic indicators	Groups of surveyed airline workers (*n* = 87)			
		I Group (*n* = 25)	II Group (*n* = 28)	III Group (*n* = 17)	IV Group (*n* = 17)
1.	Papillary-marginal-alveolar index, % (21% and more)	68.2 ± 7.3	29.8 ± 3.4	0	0
	p	I–II < 0.01; I–III < 0.01; I–IV < 0.01; II–III < 0.01; II–IV < 0.01; III–IV > 0.05			
2.	Bleeding index (2nd degree)	15.5 ± 2.7	11.9 ± 1.6	0	0
	p	I–II < 0.01; I–III < 0.01; I–IV < 0.01; II–III < 0.01; II–IV < 0.01; III–IV > 0.05			
3.	Fedorov-Volodkina index (> 2.1 points)	58.3 ± 5.7	46.0 ± 4.8	43.3 ± 4.7	24.9 ± 3.6
	p	I–II < 0.01; I–III < 0.01; I–IV < 0.01; II–III < 0.01; II–IV < 0.01; III–IV < 0.05			
4.	Green-Vermillion index (> 1.0 score)	95.3 ± 3.5	68.8 ± 4.7	43.2 ± 4.3	34.6 ± 4.4
	p	I–II < 0.01; I–III < 0.01; I–IV < 0.01; II–III < 0.01; II–IV < 0.01; III–IV < 0.05			
5.	Silnes-Lowe index (2–3 points)	44.1 ± 4.4	0	0	0
	p	I–II < 0.01; I–III < 0.01; I–IV < 0.01; II–III < 0.01; II–IV < 0.01; III–IV > 0.05			

DISCUSSION

The data obtained indicate that the papillary-marginal-alveolar index of more than 21%, indicating the presence of severe inflammatory process in the marginal periodontium, was visualized with a high degree of reliability in the flight personnel of Group I (68.2 ± 7.3%) compared to the ground service aviation workers (Group II, 29.8 ± 3.4%).

No severe forms of chronic gingivitis were recorded in group III and IV patients. Severe bleeding index (grade 2) was detected rarely and only in aviation workers of groups I and II, not significantly different from each other (15.5 ± 2.7% and 11.9 ± 1.6%, respectively). Fedorov-Volodkina index, which is 2.1 points or more and indicates unsatisfactory condition of the oral cavity, was determined in all groups of airline workers, but the high value was visualized in group I, 1.3, 1.4 and 2.3 times exceeding the frequency of this index in groups II, III and IV (58.3 ± 5.7%, 46.0 ± 4.8%, 43.3 ± 4.7% and 24.9 ± 3.6%, respectively).

The Green-Vermillion index, which is more than 1.0 point, indicating severe plaque and mineralized dental deposits, is found in almost all aviation flight workers of Group I (95.3 ± 3.5%), significantly different from Groups II, III and IV (68.8 ± 4.7%, 43.2 ± 4.3% and 34.6 ± 4.4%, respectively). Finally, the Silnes-Lowe index score of 2.0–3.0, indicating the presence of dental plaque and intense deposition of mineralized and non-mineralized dental deposit, was detected in 44.1 ± 4.4% in group I of flight personnel and was not diagnosed in the other groups of civil aviation workers.

CONCLUSIONS

1. The data obtained allow us to conclude that the inflammatory process of severe severity in the marginal periodontium is most pronounced in flight personnel.

2. The severity of these transformations is most clearly manifested in the hemomicrocirculatory channel of the periodontium and depends both on the type of the influencing factor of aviation flight and on the sensitivity of oral organs and tissues to the impact of these unfavorable factors.

3. Stress-inducing factors of aviation flight (noise, hypoxia, barometric pressure variations, vibration, hyperweight) with prolonged exposure to organs, tissues and ecosystems of the oral cavity lead to untypical and nonspecific functional changes.

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AUTHOR'S CONTRIBUTION

Gayur G. Ashurov – has made a substancial contribution to the concept or design of the article; revised the article critically for important intellectual content; approved the version to be published.

Mirzoumar K. Shokirov – has made a substantial contribution to the concept or design of the article; the acquisition, analysis, or interpretation of data for the article.

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