FACTORS THAT CAUSE URINARY SYSTEM TUBERCULOSIS IN SAMARA REGION

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Key words: tuberculosis, urinary system, complications, stomach and bowels problems.

The article contains statistic analysis of 350 patients treated for extrapulmonary tuberculosis in Samara TB Hospital from 2002 till 2006. The research proves that diagnostics strongly depends on the following factors: non-tuberculosis aetiology concomitant diseases, excretive urography data, micobacteria sensitivity to rifampicyn, flora sensitivity to doxicycline in terms of general pyelonephritis, elimination of bacilli.

Current epidemiologic situation in Russian Federation is characterised by the increase of sickness record,death rate in 1997-1999 and by steady growth of these indexes in 2000-2003.

Thus, the sickness record in 1999 was 85,2 people per 100000 citizens,in 2000 the number grew up to 90,7; lethal record index was 20,1 and 20,4 individuals correspondingly (M.I. Perelman, V.S. Odinets).

The scientists involved in the research proved that the reasons for the unfavourable epidemiologic situation are low life level of the majority of the popoulation, malnutrition, alcohol and drug addiction, migration, increasing number of bums,inappropriate conditions of imprisonment, general lack of medicines supply,etc.(T.A. Khudushina, M.G. Maslakova, E.P. Voloshina, E.F. Serebrov, A.A. Shevchenko). Also grew the number of pupils and students, executives, disabled and retired who suffer from TB (M.M. Averbach).

The rising number of patients with several organs and systems affection (45%) demonstrates the problems related with late extrapulmonary diagnostics (M.N. Kochorova, A.V. Semenovsky, A.N. Oleynick). V.V. Bortshevsky highlights that 40-45% cases are typical urinary system tuberculosis.

E.M. Parmon concentrates on nephrotuberculosis pathomorphism. Therefore sorting out the causes of urine TB is a crucial issue nowadays.

The research target is to study the factors causing tuberculosis in Samara region.

The survey was carried out on the basis of information provided by Samara TB Hospital №1 with its 350 patients' anamnesis. Women made 202 and men made 148 cases. The age category varied from 25 to 71- year-olds.

The standards for examination of urological patients were implied, liver functioning ability was studied, all treated had electrocardiography and had their lungs X-rayed. Not all the patients had Creatinine tests so this index was not taken into consideration in the research. All the 350 patients were examined by neuropathist, ophthalmologist and E.N.T. Specialist. The amount of mycobacteria in urine was checked via bacterioscopic and bacteriologic methods. All the patients had excretive nephrography. The researchers analysed main disease complications, coexistent diseases of tuberculosis and non-tuberculosis aetiology,surgical procedures.

The statistic analysis was carried on with following statistic methods:

1. basic statistic characteristic computation
2. correlation analysis
3. calculation for Pearson correlation and cheking its statistical significance
4. regression analysis
5. checking statistical hypotheses.

"Chi-square" criterion was implied to check hypothesis on factors' presupposed interrelation.

The research shows there is no connection between most of factor indexes and clinical diagnosis. There were some links between a few factor indexes only.

Table 1 illustrates common conclusions about the dependance between clinical diagnosis for nephrotuberculosis and several factor indexes.

Special attention should be paid to the "Abortion" factor. Taking into consideration

* Rais M. Nizamov, chief doctor of the state public health institution of Samara regional tuberculosis hospital, Doctor of Higher Category Elena V. Sukhova, Doctor of Medicine, Professor, Head of the Department "Life safety", Samara State University of Economics, Doctor of Higher Category.

Table 1

Factor index	$\chi^2_{набл}$	$\chi^2_{крит}$	(+) (-) connection
Sex	2,49	5,99	-
Elimination of bacilli	36,88	5,99	+
Complications	12,50	5,99	+
Coexistent diseases of TB aetiology	3,85	5,99	-
Coexistent diseases of non-TB aetiologyo	141,00	5,99	+
HBsAg	1,78	5,99	-
X-ray data	1,83	5,99	-
Excretive urography data	43,28	15,51	+
Electrocardiography results (arterial hypertension)	6,68	5,99	+
Surgery experienced	0,09	5,99	-
Abortions experienced	21,58	15,51	+
Flora sensitivity to lincomycine	6,53	5,99	+
Mycobacteria sensitivity to rifampicyn	70,85	5,99	+
Mycobacteria sensitivity to hentamycine	2,74	5,99	-
Flora sensitivity to oxicilyne	3,48	5,99	-
Flora sensitivity to doxicilyne	40,44	5,99	+
Mycobacteria sensitivity to canamy cine	3,43	5,99	-
Mycobacteria sensitivity to streptomycine	1,04	5,99	-

extreme amount of variations - from 0 to 37 to provide assosiation analysis data compression method was implied. Thus real indexes are substituted with scale ones: "0" means "no abortions ever", "1" stands for "had abortions". So, the abortion experience was considered as it is.

The link between nephrotuberculosis clinical diagnosis and elimination of bacilli in urine was found out as well as the connection with complications, coexistent non-tuberculosis aetiology diseases, electrocardiography results (that of arterial hypertension in particular), abortions, flora sensitivity to lincomycin, mycobacteria sensitivity to rifampycin, flora sensitivity to dioxyciline.

To estimate the level of connection between the intensity of nephrotuberculosis clinical implications and various factor indexes point estimation Chuprov, Cramer and Pearson coefficients were calculated. These very coefficients are the ones that are most frequently used in tables with r x s dimensionality. They are represented in Table 2.

Pearson coefficient is calculated with the formula

$$P = \sqrt{\frac{\chi^2}{\chi^2 + n}},$$

n here is the population size.

Largest extremum of the coefficient depends on line and column quantity. Chuprov coefficient is introduced in order to get more accurate information:

$$C = \sqrt{\frac{\chi^2}{n(r-1)(s-1)}}.$$

Table 2

Factor Index	Pearson Coefficient	Chuprov Coefficient	Cramer Coefficient
Elimination of bacilli	0,317	0,398	0,335
Complications	0,191	0,232	0,195
Coexistent diseases of non-TB aetiologyo	0,548	0,779	0,655
Excretive urography data	0,341	0,610	0,513
Electrocardiography results (arterial hypertension)	0,141	0,202	0,143
Abortions experienced	0,188	0,227	0,191
Flora sensitivity to lincomycine	0,188	0,227	0,191
Mycobacteria sensitivity to rifampicyn	0,533	0,748	0,629
Flora sensitivity to doxicilyne	0,429	0,565	0,475

This very coefficient can reach 1 at its maximum if the number of table lines is equal to the quantity of its columns.

Cramer coefficient is calculated with the following formula

$$K = \sqrt{\frac{\chi^2}{n \cdot \min\{r-1, s-1\}}}.$$

Cramer coefficient maximum converges to 1 irrespective of the number of conjugation table lines and columns.

The reciprocal coefficient demonstrates the connection between the indexes. The closer the coefficient to 1 the stronger the link is, the closer it is to 0 the weaker the connection is.

According to Table 2 to learn interval estimation for conjugation coefficients one should define an approximate quantity for standard mean square error Chuprov, Cramer and Pearson coefficients.

Chuprov standard mean square error is caluculated with the formula

$$S_C = \sqrt{\frac{D\chi^2}{4 \cdot n^2 \cdot (r-1) \cdot (s-1) \cdot C^2}}.$$

Cramer standard mean square error is calculated with the formula

$$S_K = \sqrt{\frac{D\chi^2}{4 \cdot n^2 \cdot \min\{r-1, s-1\}^2 \cdot K^2}}.$$

Pearson standard mean square error is calculated with the formula

$$S_P = \sqrt{\frac{n^2 \cdot D\chi^2}{4 \cdot \chi^2 \cdot (n+\chi^2)^3}},$$

$D\div^2$ - dispersion estimation.

$$D\div^2 = 4\div^2.$$

According to the law of large numbers P,C.K statistics obey the Law.

Interval estimation is sorted out on the basis of the point one. Top and bottom limits of the confidence interval one may calculate with the following formulae

- Chuprov coefficient

$$C \pm \Phi^{-1}(\gamma) \cdot \hat{S}_C;$$

- Cramer coefficient

$$K \pm \Phi^{-1}(\gamma) * \hat{S}_K;$$

- Pearson coefficient

$$P \pm \Phi^{-1}(\gamma) \cdot \hat{S}_P,$$

$\Phi^{-1}(\gamma)$ is calculated with the Laplase integral function table.

When interval estimate includes zero value contingency coefficient then it is of minor importance. Table 3 demonstrates connection estimate of the factors which turned out to be significant according to the results of linear templates with Chuprov coefficient.

Table 3 illustrates different indexes of point and interval estimations with Chuprov coefficient. The closest dependance has been identified in terms of urinary system tuberculosis clinical diagnosis on one hand and coexistant diseases of non-tuberculosis aetiology on the other. There also exist a link between urinary system tuberculosis clinical diagnosis and excretive urography, one more link is the one between urinary system tuberculosis clinical diagnosis and mycobacteria sensitivity to rifampicyn,also between urinary system tuberculosis clinical diagnosis and flora sensitivity to doxicyline.

Table 3

Factor Index	Point Estimation	Interval Estimation
Elimination of bacilli	0,398	0,336...0,460
Complcations	0,232	0,166...0,297
Coexistent diseases of non-TB aetiology	0,779	0,727...0,830
Excretive urography data	0,610	0,584...0,636
Electrocardiography results (arterial hypertension)	0,202	0,146...0,258
Abortions experienced	0,227	0,138...0,316
Flora sensitivity to lincomycine	0,227	0,133...0,321
Mycobacteria sensitivity to rifampicyn	0,748	0,662...0,835
Чувствительность флоры к доксициклину	0,565	0,482...0,648

Table 4 shows the estimate of the connection of the factors which turned out to be significant as a result of implementing linear templates with Cramer coefficient.

Table 4

Factor Index	Point Estimation	Interval Estimation
Elimination of bacilli	0,335	0,230...0,439
Complications	0,195	0,085...0,305
Coexistent diseases of non-TB aetiologyo	0,655	0,568...0,742
Excretive urography data	0,513	0,469...0,557
Electrocardiography results (arterial hypertension)	0,143	0,031...0,254
Abortions experienced	0,191	0,041...0,341
Flora sensitivity to lincomycine	0,191	0,032...0,350
Mycobacteria sensitivity to rifampicyn	0,629	0,483...0,775
Flora sensitivity to doxicilyne	0,475	0,336...0,614

Table 5

Factor Index	Point Estimation	Interval Estimation
Elimination of bacilli	0,317	0,229...0,406
Complications	0,191	0,087...0,296
Coexistent diseases of non-TB aetiology	0,548	0,497...0,599
Excretive urography data	0,341	0,238...0,444
Electrocardiography results (arterial hypertension)	0,141	0,033...0,250
Abortions experienced	0,188	0,045...0,330
Flora sensitivity to lincomycine	0,188	0,037...0,338
Mycobacteria sensitivity to rifampicyn Abortions experienced	0,533	0,444...0,621
Flora sensitivity to doxicilyne	0,429	0,327...0,532

Table 4 demonstrates that point estimation of different significant factors and interval ones have varied indexes. The closest dependance has been identified in the sphere of nephrotuberculosis clinical diagnosis and coexistant diseases of non-tuberculosis aetiology. There is a connection between nephrotuberculosis clinical diagnosis and excretive urography, between urinary system tuberculosis clinical diagnosis and mycobacteria sensitivity to rifampicyn,also between urinary system tuberculosis clinical diagnosis and flora sensitivity to doxicyline, between nephrotuberculosis clinical diagnosis and bacilli elimination.

Table 5 delivers the estimation of the connection of the factors which turned out to be significant as a result of implementing linear templates with Pearson coefficient.

Table 5 showsthat point estimation of different significant factors and interval ones have varied indexes. The closest dependance has been identified in the sphere of nephrotuberculosis clinical diagnosis and coexistant diseases of non-tuberculosis aetiology; between nephrotuberculosis clinical diagnosis and excretive urography, between urinary system tuberculosis clinical diagnosis and mycobacteria sensitivity to rifampicyn, between urinary system tuberculosis clinical diagnosis and flora sensitivity to doxicyline, between nephrotuberculosis clinical diagnosis and bacilli elimination.

Considering the data from Tables 3-5, it is obvious that 0 doesnt get into any of confidence intervals. So, we can't neglect the certain connection between the coefficients observed. Moreover, this connection is rather significant as Pearson, Cramer and Chuprov coefficients have been calculated according to the sample of reasonable volume (n = 329) and coefficients themselves turned out to be significant.

Squared coherence (which is performed in percentage) points out the dependance of resulting feature on the causative one. For example, Table 5 shows that Pearson mycobacteria sensitivity to rifampycin coefficient makes 0,533. Consequently nephrotuberculosis clinical diagnosis depends 28,4% on mycobacteria sensitivity to rifampycin, and 71,6% (100-28,4) it depends on the other factors.

Therefore urinary system tuberculosis clinical diagnosis strongly depends on the following factors: the occurence of coexistant diseases of non-tuberculosis aetiology, the results of excretive urography, mycobacteria sensitivity to rifampicyn, flora sensitivity to doxicyline, the presense of a typical pyelonephritis, bacilli elimination.

V.A. Sokolov, I.V. Kartashov, A.I. Piven suggest complex beam-therapy to identify kid-

ney tuberculosis. These scientists examined 71 patients. The conclusions are the following:

Parenchymatous kidney tuberculosis can't be visualised with every means of X-ray examination, including ultra-sound examination, computer laminagraphy and excretive urography. The only diagnostic means is mycobacteria existence in urine tests.

The results of our research prove that urinary system tuberculosis clinical diagnosis is interdependent on the results of excretive urography and the presense of mycobacteria in urine tests.

Mycobacteria sensitivity to rifampicyn is the key factor that influences clinical diagnosis.

Samara region statistics shows that the most drastic treatment for typical flora in terms of urinary system tuberculosis.

The research results prove that there exists a strong connection between urinary system tuberculosis clinical diagnosis and coexistant diseases of non-tuberculosis aetiology. Consequently, total examination of patients is needed to exclude or admit coexistant diseases of non-tuberculosis aetiology. Such thorough checking is possible only in the frameworks of a profeccional clinic possesing skilled professional specialists,modern diacrisis equipment.

Nowadays there is no such a well-equipped extrapulmonary tuberculosis clinic in Samara region. This fact keeps under the possibility of brief diagnostics,adequate estimation of implying the means of extrapulmonary tuberculosis treatment. So, our research makes evident the necessity for such a hospital in Samara region.

Our conclusions are the following:

1. There is a connection between urinary system tuberculosis clinical diagnosis and bacilli elimination in urine tests, complications, presense of coexistant diseases of non-tuberculosis aetiology, results of excretive urography and electrocardiography (arterial hypertension),abortions, flora sensitivity to lincomycin, mycobacteria sensitivity to rifampicyn, flora sensitivity to doxicyline.

2. There is a strong connection between urinary system tuberculosis clinical diagnosis and coexistant diseases of non-tuberculosis aetiology, results of excretive urography,flora sensitivity to doxicyline,elimination of bacilli in urine, mycobacteria sensitivity to rifampicyn.

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