Overlapping Risk Factors But No Association Between HIV and Drug Resistance Among TB Patients in Kazakhstan

Tursynbayeva A[1,2], Pak S[2], Ismailov Sh[3], van den Hof S[4,5]

1. National Centre for TB Problems Ministry of Health Republic of Kazakhstan, Almaty, Kazakhstan 2. KNCV Tuberculosis Foundation, Regional office in Central Asia, Almaty, Kazakhstan, 3. PIU GFATM in Kazakhstan, Almaty, Kazakhstan, 4. KNCV Tuberculosis Foundation, The Hague, The Netherlands, 5. Amsterdam Institute for Global Health and Development, Amsterdam, The Netherlands

Background:

Kazakhstan has a high prevalence of multi-drug resistance (MDR) among tuberculosis (TB) cases and a low, but growing, HIV prevalence.

Objectives:

Using the 2007-2011 national electronic TB register:
- Describe the epidemiology of MDR and HIV among TB cases.
- Establish whether there is an association between MDR and HIV among TB cases.

Results:

Patient characteristics
- In 2007-2011, a total of 146,416 patients diagnosed with TB were notified and started treatment.
- The notification rate per 100,000 populations went down from 184 in 2007 to 156 in 2011, and average relative annual decrease of 4%.
- Half of all TB patients diagnosed are young adults (15-34 years) and 60.5% are male.
- Excluding transfer-in patients for whom treatment history is unavailable in the electronic register, 20% of patients are diagnosed with new smear-positive TB, 45% with new smear-negative TB, and 35% with previously treated TB.
- Among new patients, 31.2% were smear-positive. Of all smear-positive TB patients 69.2% had a positive culture result registered compared to 16.6% of all smear-negative TB patients. Overall, 41.6% of patients have a positive smear at diagnosis, and 38.6% a positive culture. DST results are available for 92.7% of culture-positive cases.

HIV
- HIV-testing results were available for 142,349 (97.2%) TB patients. Among all TB patients HIV prevalence increased from 0.6% to 1.5%.
- HIV prevalence was the highest among patient returning after default (2.7%).
- Characteristics statistically significantly associated with HIV in multivariate analysis were drug use (OR=56.2, 95% CI 48.1-65.7), prison history (OR=5.7, 95% CI 4.7-6.8), alcoholism (OR=2.7, 95% CI 2.4-3.1) and homelessness (OR=2.8, 95% CI 2.4-3.3).

Drug Resistance
- Among the 50,859 (36%) notified TB patients with a HIV-test result and known drug susceptibility profile, 38.3% had TB sensitive to all first-line TB drugs, 8.5% had TB with mono-resistance to one of these first-line drugs, 17.1% had poly-resistant TB, and 36.1% had MDR-TB.
- The prevalence of MDR-TB patients did not show a clear trend over the years 2007-2011, also not when stratified by new and retreatment patients.
- MDR was most prevalent among patients who failed previous TB treatment (56%) and among those who relapsed after successful treatment (48%), and least high among new patients (27%).
- Characteristics statistically significantly associated with MDR-TB were a history of previous treatment (OR=3.6, 95% CI 3.3-4.0), a history of imprisonment (OR=2.1, 95% CI 1.9-2.4), homelessness (OR=1.2, 95% CI 1.1-1.3), urban residency (OR=1.1, 95% CI 1.05-1.1) and younger age groups.

Association between MDR and HIV
- In univariate analysis, HIV-infection status was associated with an increased prevalence of MDR (OR=1.2, 95% CI 1.02-1.4).
- TB patients at particular risk for being infected both with HIV and MDR were those using drugs (12.5%), and those with a history of imprisonment (3.4%).
- In multivariate analysis, when adjusting for patient characteristics, the association between MDR and HIV disappeared (OR=1.0, 95% CI 0.86-1.2).

		Characteristics		HIV-Test Positive		OR	95%CI	aOR	95%CI	HIV and DST	MDR-TB		OR	95%CI	aOR	95%CI	HIV-Positive and MDR-TB	
		n	%	n	%					n	n	%					n	%
HIV	Negative									721	288	39,9	ref		ref			
	Positive									50138	18050	36	1.2	1.02-1.4	1	0.86-1.2		
Year	2007	28566	20.1	167	0.6	ref		ref			3086	36.6	ref		ref		33	0.4
	2008	30706	21.6	296	1	1.7	1.4-2.0	1.8	1.5-2.2	8422	3592	33.9	0.89	0.84-0.94	0.89	0.84-0.95	44	0.4
	2009	28885	20.3	327	1.1	1.9	1.6-2.3	2.1	1.7-2.5	11069	3759	34	0.89	0.84-0.94	0.87	0.82-0.93	57	0.5
	2010	28351	19.9	405	1.4	2.5	2.1-3.0	2.7	2.2-3.2	11535	4303	37.3	1	0.97-1.1	1	0.96-1.1	79	0.7
	2011	25841	18.2	397	.15	2.7	2.2-3.2	2.9	2.4-3.5	9233	3598	39	1.1	1.04-1.2	1.1	1.02-1.2	75	0.8
Sex	Male	86121	60.5	1166	1.4	1.8	1.6-2.0	1.3	1.2-1.5	33115	12069	36.4	1.1	1.01-1.1			224	0.7
	Female	56228	39.5	426	0.8	ref		ref		17744	6269	35.3	ref				64	0.4
Age (Years)*	0-14	4459	3.2	14	0.3	ref		ref		491	192	39.1	ref		ref		1	0.2
	15-24	34970	24.5	103	0.3	0.94	0.54-1.6	0.8	0.42-1.3	10720	4171	38.9	0.99	0.82-1.2	0.84	0.70-1.02	15	0.1
	25-34	36728	25.8	685	1.9	6	3.6-10.3	3.7	2.1-6.4	13292	5113	38.5	0.97	0.81-1.2	0.7	0.58-0.85	123	0.9
	35-44	26943	18.9	575	2.1	6.9	4.1-11.8	3.9	2.2-6.7	10661	3964	37.2	0.92	0.77-1.1	0.61	0.51-0.74	113	1.1
	45-54	21820	15.3	176	0.8	2.6	1.5-4.5	1.5	0.86-2.7	8917	2988	33.5	0.78	0.65-0.95	0.5	0.41-0.61	28	0.3
	55+	17417	12.3	39	0.2	0.71	0.39-1.3	0.5	0.27-0.95	6776	1908	28.2	0.61	0.51-0.74	0.38	0.31-0.46	8	0.1
Residency**	Urban	84648	60.1	1313	1.6	3.3	2.9-3.8	2.7	2.3-3.0	30259	11176	36.9	1.1	1.05-1.1	1.1	1.1-1.1	229	0.4
	Rural	56136	39.9	265	0.5	ref		ref		20089	7028	35	ref				56	0.3
Patient Category	New SS+	25897	18	314	1.2	ref		ref		16629	4285	25.8	ref		ref		60	0.4
	New SS-	56983	40.3	424	0.7	0.61	0.53-0.71	0.7	0.59-0.79	7630	2154	28.2	1.1	1.07-1.2	1.1	0.99-1.1	28	0.4
	Relapse	33026	23.1	437	1.3	1.1	0.94-1.3	0.9	0.76-1.03	14731	7057	47.9	2.6	2.5-2.8	2.9	2.8-3.1	109	0.7
	Failure	4543	3.2	77	1.7	1.4	1.1-1.8	1.2	0.96-1.6	2378	1326	55.8	3.6	3.3-4.0	3.8	3.5-4.2	26	1.1
	Default	6322	4.4	169	2.7	2.2	1.9-2.7	1.1	0.91-1.4	3533	1369	38.7	1.8	1.7-2.0	1.9	1.8-2.1	31	0.9
	Transfer In	15578	11	171	1.1	0.9	0.75-1.1	0.6	0.48-0.72	5958	2147	36	1.6	1.5-1.7	1.5	1.4-1.7	34	0.6
Homeless	Yes	5155	3.6	149	3	2.8	2.4-3.3	1.5	1.2-1.8	2576	1036	40.2	1.2	1.1-1.3	1.1	1.01-1.2	27	1
	No	137194	96.4	1443	1.1	ref		ref		48283	17302	35.8	ref				261	0.5
Drug Addiction	Yes	796	0.6	275	52.8	56.2	48.1-65.7	23.7	19.9-28.1	361	160	44.3	1.4	1.1-1.7			45	12.5
	No	141553	99.4	1317	0.9	ref		ref		50498	18178	36	ref				243	0.5
Alcoholism	Yes	8582	6	234	2.8	2.7	2.4-3.1	1.4	1.2-1.7	4377	1575	36	1	0.93-1.1			44	1
	No	133767	94	1358	1	ref		ref		46482	16763	36.1	ref				244	0.5
History of Imprisonment	Yes	2327	1.6	131	6	5.7	4.7-6.8	2.5	2.0-3.2	1025	557	54.3	2.1	1.9-2.4	1.8	1.6-2.1	35	3.4
	No	140022	98.4	1461	1.1	ref		ref		49834	17781	35.7	ref		ref		253	0.5
Migrant	Yes	4567	3.2	22	0.5	0.42	0.28-0.64	0.3	0.21-0.52	1635	554	33.9	0.91	0.82-1.01			5	0.3
	No	137782	96.8	1570	1.2	ref		ref		49224	17784	36.1	ref				283	0.6
Total		142349	100	1592	1.1					50859	18338	36.1					288	0.6

*2 missing values **1565 missing values

Conclusions:

Among TB patients in Kazakhstan, risk factors for HIV and MDR are largely overlapping. However, MDR-TB prevalence was not associated with HIV-status. TB patients from socially vulnerable groups were at particular risk for HIV/MDR co-infection. These patients are at an increased risk of being HIV positive and contracting drug-resistant TB, which increases their risk of mortality, complicates patient management, and may facilitate transmission of MDR-TB.

Recommendations:

Enhanced efforts are necessary to provide care to these socially vulnerable populations:
- Active case finding,
- ART for HIV positive individuals to prevent development of MDR-TB,
- Psychosocial support to successfully finish MDR-TB treatment.