

EPIDEMIOLOGY OF B/C VIRUS INFECTION HEPATITIS IN THE NORTHERN MOLDAVIAN CORRECTIONAL FACILITIES RISK FACTORS

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EPIDEMIOLOGY OF B/C VIRUS INFECTION HEPATITIS IN THE NORTHERN MOLDAVIAN CORRECTIONAL FACILITIES-RISK FACTORS (Abstract). **Aim.** To identify the specific risk factors for chronic hepatitis B/C virus infections in the correctional system in Moldova (Romania). **Material and methods.** The study included 533 subjects imprisoned in three correctional facilities located in the Northern region of Moldova. The subjects were divided into 2 groups: HBV/HBC group – 108; Control group – 425. **Results.** The risk factor for transfusion-contracted HBV/HCV was 3.73; the empirical treatment of the HBV/HBC group resulted in a relative infection risk of 2.62; syringe sharing in the HBV/HBC group accounted for a risk factor of over 4 (OR=4.33); tattooing induced a relative risk factor of 1.25, and piercing was a risk factor of approximately 2 (OR=1.97); sharing personal care items represented a risk factor of over 2 (OR=2.02). Injection drugs induced a relative risk of over 4 (OR=4.33). In the HBV/HCV group, self-aggression represented a risk factor of 1.65. **Conclusions** Prison environment, by its specific and nonspecific contamination modalities (shared with the rest of the population but more common) causes that inmates to be 2-4 times more exposed to hepatitis B/C infection. **Key words:** B/C HEPATIC VIRUS, IMPRISONED POPULATION, RISK FACTORS, EPIDEMIOLOGY

This study on inmate specific diseases and prevention possibilities reflects the epidemiological permanent concern for the needs of people deprived of their freedom. The expected impact is the reduction of morbidity and mortality among *people deprived of their freedom* (PDF) under conditions specific to the correctional system and in correlation to the trend of these indicators in the general population. The aim of this study was to identify the specif-

ic risk factors for chronic hepatitis in the correctional facilities located in North Moldavia, the seroprevalence among the studied population, and their correlation with national and international statistical data.

MATERIAL AND METHODS

The informed consent was obtained from every PDF included in the study. An epidemiological questionnaire was used to

determine the risk factors. The research was performed in the medical offices of correctional facilities in Northern Moldavia and included new inmates but also inmates sentenced to more than 5 years already in prison for some time who met the *selection criteria*. The selection criteria were: age over 18; decision-making abilities; newly admitted inmates or transferred to serve their sentence; freely-expressed consent. *Exclusion criteria*: age under 18; no decision-making ability; pregnancy. 533 inmates were enrolled in this study conducted in the interval October 2010– October 2012 in three correctional facilities in Northern Moldavia. 479 (89.9%) inmates in Iași correctional facility and 49 (4.5%) inmates in Tg. Ocna correctional facility were subjected to epidemiological screening. Also included in the study were 30 female inmates in Bacau correctional facility. The sampling methods demonstrated that compared to the total number of inmates in Romania (n=31,720), with a sampling error of $\pm 4.2\%$, the study group was representative. Depending on the presence or absence of hepatitis B/C virus infection, the study group was divided into 2 subgroups: HBV/HCV – 108 subjects found positive; Controls – 425 subjects found negative for hepatitis B/C virus.

The study was transversal, presenting the situation at one specific point in time in study population. In order to measure the intensity of the associations between the monitored parameters we used as analytical technique the estimation of the relative risk (OR). The advantages of this type of study are: easy to perform, moderately expensive, performed in a given population easy to approach and observe, and is reproducible.

This last advantage opens the perspective of using the method as a working tool for this type of population, with the aim of targeting the population to be tested and possibly diagnosed with hepatitis virus infection. To assess the specificity of the risk factors the Receiver Operating Characteristic (ROC) curve was generated by minimizing the distance between the ideal sensitivity (100%) and the 1-specificity point (0%). The data were uploaded and processed with the help of the statistical functions of *SPSS 13.0* software.

RESULTS

Medical Risk factors. 42.6% of the subjects in the HBV/HCV group and 34.4% of those in the control group had surgical interventions ($p=0.139$). In both groups, approximately 8% of the subjects had frequent hospital admissions, without significant differences in frequency distribution ($p=0.882$). The percentage of subjects who received blood transfusions was significantly higher in the HBV/HCV group ($p=0.001$) as compared to the control group (16.7% vs. 4.5%). Empirical treatment was used significantly more frequently in the HBV/HCV group (11.1%) as compared to controls (4.2%) ($p=0.011$). 36.1% of the HBV/HCV subjects and 27.1% of the controls had dental treatments the frequency distributions being statistically insignificant ($p=0.083$). Accident-related risk factors were found in 15.7% of the subjects in the HBV/HCV and 1.3% of the controls ($p=0.273$) (tab.I).

The ROC curve highlights that blood transfusions and use of empirical treatment were the main risk factors for hepatitis B or C virus infection (fig.1).

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TABLE I
Risk factors by study subgroups

Risk factor	HBV/HCV (n=108)		Controls Lot (n=425)		Significance		OR	CI 95%
	n	%	n	%	χ^2	p		
Medical risk factors								
Surgical interventions	46	42.6	146	34.4	2.19	0.139	1.24	0.96÷1.60
Frequent hospital admissions	9	8.3	36	8.5	0.02	0.882	0.98	0.49÷1.98
Blood transfusions	18	16.7	19	4.5	17.99	0.001	3.73	2.03÷6.86
Empirical treatment	12	11.1	18	4.2	6.39	0.011	2.62	1.30÷5.27
Dental treatment	39	36.1	115	27.1	3.01	0.083	1.33	0.99÷1.79
Accident	17	15.7	48	11.3	1.20	0.273	1.39	0.84÷2.32
Non-Medical Risk Factors								
Syringe sharing	11	10.2	10	2.4	11.97	0.001	4.33	1.89÷9.93
Cosmetic treatment	9	8.3	30	7.1	0.06	0.804	1.18	0.58÷2.41
Tattoos	70	64.8	220	51.8	5.40	0.020	1.25	1.06÷1.48
Piercing	49	45.4	98	23.1	20.36	0.001	1.97	1.50÷2.58
Sharing personal care items	40	37.0	78	18.4	16.37	0.001	2.02	1.47÷2.77
Toxic substances consumption								
Daily alcohol intake	70	64.8	216	50.8	6.23	0.013	1.28	1.08÷1.51
Injection drug	11	10.2	10	2.4	11.97	0.001	4.33	1.89÷9.93
Cocaine	8	7.4	18	4.2	1.25	0.264	1.75	0.78÷3.91
Pain killers	32	29.6	82	19.3	4.87	0.027	1.54	1.08÷2.18
Tuberculosis medication	11	10.2	46	10.8	0.04	0.986	0.94	0.50÷1.75
Hepatotoxic medication	19	17.6	66	15.5	0.14	0.707	1.13	0.71÷1.80
Accidental poisoning	13	12.0	14	3.3	11.93	0.001	3.65	1.77÷7.54
Psychiatric treatment	23	21.3	85	20.0	0.03	0.869	1.06	0.71÷1.60
Aggression								
Sexual	2	1.9	12	2.9	0.05	0.820	0.66	0.15÷2.89
Physical	20	18.5	68	16.0	0.23	0.628	1.16	0.74÷1.82
Self-aggression	42	38.9	100	23.5	9.62	0.002	1.65	1.23÷2.21

Non-medical risk factors. The proportion of HBV/HCV subjects sharing syringes was significantly greater (p=0.001) as compared to controls (10.2% vs. 2.4%). The frequency distribution of the subjects who had cosmet-

ic treatment was reduced in both study groups (8.3% vs. 7.1%), without statistically significant percentage differences (p=0.804). The frequency of tattoos was high in both study groups, 51.8% in the control group

and 64.8% in the HBV/HCV group, but the proportion of HBV/HCV subjects was significantly higher ($p=0.02$). Significantly more HBV/HCV subjects had piercing (45.4% vs. 23.1%) ($p=0.001$). 37% of the HBV/HCV subjects and only 18.4% of the

controls shared personal care items, statistically significant percentage differences ($p=0.001$). The ROC curve showed that sharing syringes and personal care items were the main risk factors for hepatitis B or C virus infection (fig. 1).

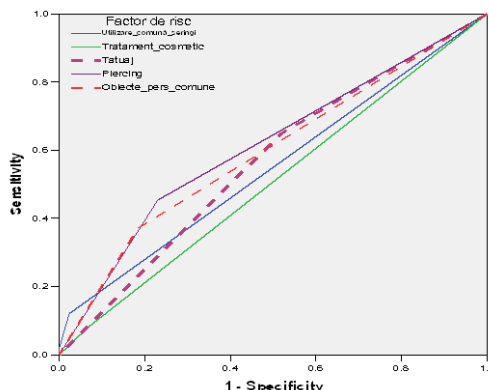
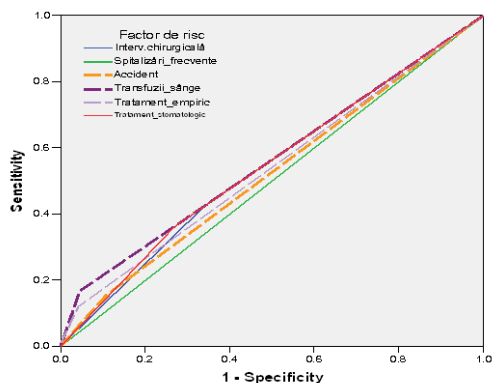


Fig. 1. The specificity of medical and non-medical risk factors

Only 28.6% of drug users had no prior criminal history, the remaining 71.4% having previously served sentences with deprivation of freedom. Of all tattooed subjects only 23.5 % had no prior criminal history, getting tattoos when free, possibly in tattoo parlors, and 76.5% got tattoos in the correctional facility, in the absence of the equipment and access to sterile tattoo in-

struments. Moreover, there were inmates who got tattoos while serving their twelfth sentence with deprivation of freedom, although they had not done it while serving previous sentences. Nevertheless, the majority of inmates get tattoos when serving their first sentence in a correctional facility and report current tattoos upon subsequent imprisonments (fig. 2).

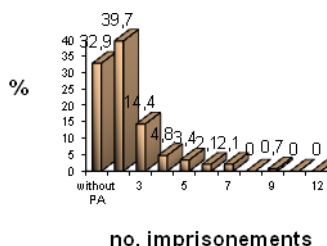


Fig. 2. Distribution of subjects with tattoos and piercings according to the number of imprisonments

As in the case of tattoos, the great majority of inmates start wearing piercings at

the beginning of their „imprisonment career” (fig. 3).

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Fig. 3. Distribution of subjects who commonly use personal objects, according to the number of imprisonments

Intake of toxic substances. 64.8% of the subjects in the HBV/HCV group and 50.8% of the controls reported daily alcohol intake, the percentage difference being statistically significant ($p=0.013$). The daily alcohol intake was of over 60 g in 62.9% of the HBV/HCV subjects and 53.7% of the controls. The frequency of subjects who use injection drugs was significantly higher in the HBV group (10.2%) as compared to the control group (2.4%) ($p=0.001$). Declaratively, crack cocaine sniffing was rare in both study groups (7.4% vs. 4.2%), the difference not being statistically significant ($p=0.264$). In the study series we noticed a significantly increased frequency ($p=0.027$) of the use of pain killers in the HBV/HCV group (29.6%) compared to the control group (19.3%). The frequency of tuberculostatic drugs use showed no significant differences between the study groups ($p=0.986$), being of approximately 10-11%. There were no significant differences in the intake of hepatotoxic substances between the study groups ($p=0.707$): 17.6% in the HBV/HCC group and 15.5% in the controls. Significantly more HBV/HCV subjects ($p=0.001$) experienced accidental poisoning than controls (12% vs. 3.3%). In both study groups approximately 20-21% of the inmates underwent psychiatric

treatment. ROC curve identified daily alcohol intake of and pain killers as the main risk factors (fig. 4).

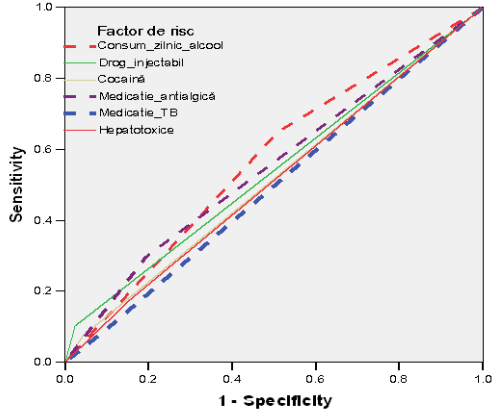


Fig. 4. Specificity of toxic substances intake as risk factors

62.8 % of inmates who drank alcohol daily had prior criminal history (fig 5).



Fig. 5. Distribution of subjects who drank alcohol daily according to the number of imprisonments

The distribution of subjects shows that 57.9 % of injection drug users and 73.1% of those who sniffed cocaine had previous criminal history.

59 % of those who chronically take pain killers, 69 % of the inmates who reported treatment with tuberculostatic drugs and 65 % of those who take psychiatric medication have been imprisoned before (fig. 7).

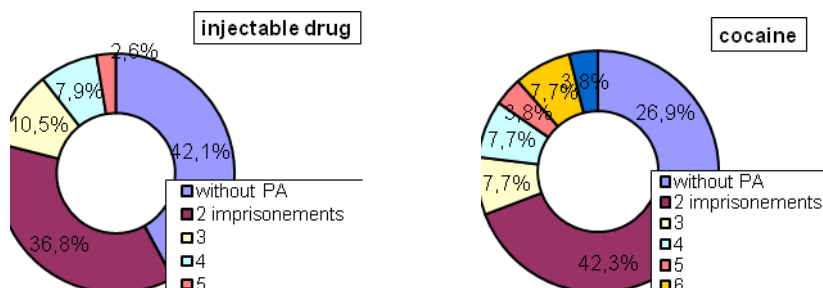


Fig. 6. Distribution of injection drug users and crack cocaine sniffers according to the number of imprisonments

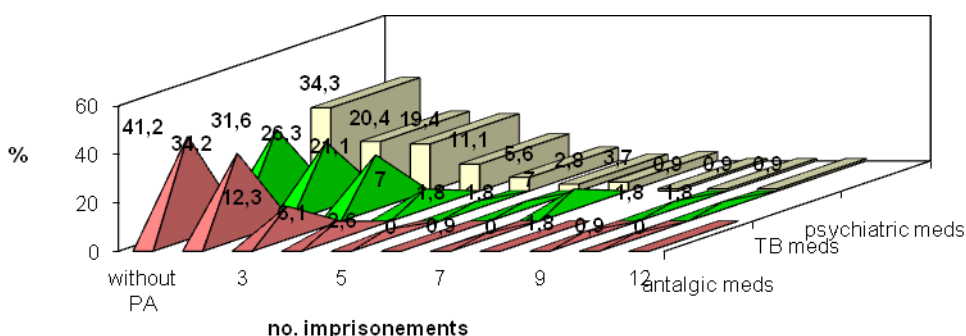


Fig. 7. Distribution of subjects by medication types according to the number of imprisonments

Other risk factors – Aggressions. 1.9% of the subjects in the HBV/HCC group and 2.8% of the controls reported they had been sexually abused, differences statistically insignificant ($p=0.820$). Physical aggression was reported by 18.5% of the HBV/HCV subjects and 16% of the controls, without significant difference in frequency between the study groups ($p=0.628$). Self-aggression was significantly more common in the HBV/HCV group (38.9%) as compared to the control group (23.5%) ($p=0.002$).

According to aggression type, the ROC curve confirmed that self-aggression is a main risk factor (fig. 8).

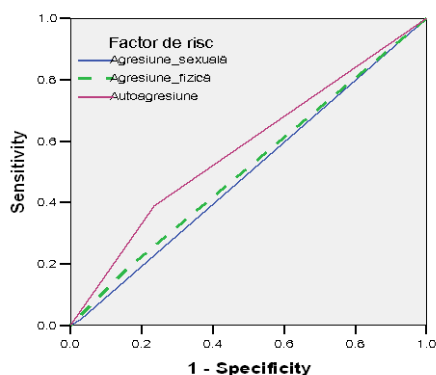


Fig. 8. Specificity of aggression as a risk factor

Physical aggression was present in 57.1% (57.1% vs. 42.9%) of the inmates

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with criminal history, sexual aggression in 73% (73% vs. 27%), whereas self-aggression was more frequent in inmates who had been in prison before (58.5% vs. 41.5%).

DISCUSSION

Chronic liver infection is an important health problem worldwide, the strategies to prevent infections, by delivering safe blood products to injection drug users are essential and applied in most countries starting with 2000 (1,2). Many inmates are not aware that they carry the virus and are identified in the chronic stage of liver disease or in the phases of complications related to over-infection or malignant change (3). In Romania there are few nationwide evaluations of the risk of hepatitis B and C virus infection, and in the correctional system only the new acute cases reported to the Public Health Authority without identifying with certainty the infection source because of inmates' lack of trust in the health system are known. If worldwide vaccinating inmates against hepatitis B manages to keep under control this form of hepatitis, in Romania, because of the precarious situation of the public health system this prophylactic measure does not exist (4). Aggression and self-aggression are risk factors specific to correctional facilities, committed for obtaining material and non-material goods, but also a hierarchical positioning among the inmates. Many times this is a form of protest against detention conditions but also a way to emotionally touch or blackmail the staff. Self-harm is done with hand-made, improvised, and shared objects: self-made knives, needles or nails made from mattress springs, iron in the structure of furniture pieces,

metal door and window parts and even glass pieces. The contamination risk is extended not only to the inmates sharing this object, but also to prisoner escort officers and security staff and even to the medical staff if aggressed by inmates or upon periodical checks of inmate personal property – accidental piercing. Minor surgical procedures as well as dental treatments represent a real epidemiological danger because they are numerous and are performed by a small number of doctors and nurses. Tattooing is another common way inmates are getting hepatitis B or C. It is a common practice among inmates, 76% of the tattooed individuals obtained it while in a correctional facility, of whom 37.8% during serving their first sentence. Tattoos are made with non-sterile, self-made and shared objects. In correctional facilities piercing is also empirically-performed, the earrings and even the piercing needle being self-made (5, 6, 7).

CONCLUSIONS

Blood transfusions account for a risk factor of 3.73; the empirical treatment induced in the HBV/HCV group a relative risk of infection of 2.62.

Sharing syringes was for the HBV/HCV group a risk factor of over 4 (OR=4.33); tattooing induced a relative risk of 1.25 in the HBV/HCV group and piercing was a risk factor of approximately 2 (OR=1.97); sharing personal care items represented a risk factor of over 2 (OR=2.02). Injection drugs induced a relative risk of over 4 (OR=4.33). In the HBV/HCV group, self-harm represented a risk factor of 1.65. Even though the frequency of crack cocaine sniffing in the HBV/HCV group was not significantly higher as compared to the

control group (7.4% vs. 4.2%), the calculated relative risk of infection with hepatic viruses was of 1.75 in the HBV/HCV group.

Accidental poisoning caused a relative risk of OR=3.65 in the HBV/HCV group.

Psychiatric treatments had a statistically insignificant study group distribution (p=0.869).

For subjects in the HBV/HCV group self-harm was a 1.65 times stronger risk factor as compared to the control group.

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NEWS

EFLECTANCE CONFOCAL MICROSCOPY FOR MEASURING *DEMODEX* DENSITY

A study by Turgut Erdemir *et al* compared the effectiveness of standardized skin surface biopsy (SSSB) and the reflectance confocal microscopy (RCM) for measuring the *Demodex* mite density. Forty-seven healthy controls and 48 patients with pityriasis folliculorum, papulopustular rosecea and erythema-telangiectatic rosacea were enrolled in the study. The area with the most intense erythema on the right cheek was selected for imaging with RCM (VivaScope 3000) and SSSB. RCM identified demodicosis in 48 patients (100%), while 42 patients (85.7%) showed high *Demodex* density (> 5 mites/cm²) with SSSB. The mean *Demodex* density measured with RCM was significantly higher than SSSB. The results demonstrate that reflectance confocal microscopy is a fast and noninvasive method, superior to SSSB, for *Demodex* mite detection (Turgut Erdemir A, Gurel MS, Koku Aksu *et al*. Reflectance confocal microscopy vs. standardized skin surface biopsy for measuring the density of *Demodex* mites. *Skin Res Technol*. 2014. doi: 10.1111/srt.12137).

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