

Observations on the relationship between opiate medications, illicit drugs and heroin use in pain patients

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Purpose

The addictive potential of opioid drugs and their similar binding sites in the brain may mean that they are all [BB1] potential gateway drugs for each other in the same way that marijuana is considered a gateway drug to other illicit narcotics. Recent reports indicate that oxycodone has a high probability of leading to heroin use due to heroin's similar effects and lower cost. Heroin (3,6-diacetylmorphine) metabolism first involves deacetylation to 6-monoacetylmorphine (6-MAM) which is then converted to morphine. It is difficult to detect heroin use from urine samples due to the short half life of heroin ($t_{1/2} \sim 6$ min); therefore, its surrogate marker, 6-MAM ($t_{1/2} \sim 25$ min) is used. This study explores the validity of these reports as well as correlations between prescription opioids and illicit drugs using urinary excretion data from routine clinical testing. This study was conducted to determine if a relationship exists between heroin use and other opioid narcotics and provide insight into trends in drug addiction.

Method

This retrospective analysis was conducted on a database of 148,200 urine samples from pain patients during routine drug screening at Millennium Laboratories between 2008 and 2010 that were tested for the presence of the heroin metabolite, 6-MAM. All samples were analyzed and were quantified using LC-MS-MS. Microsoft[®] Excel 2007 and OriginPro[®] 8.1 were used to calculate percentages and ratios relating heroin use to other opiate medications and illicit drugs. Regression analysis was conducted to determine the relationship between morphine and heroin concentrations in the urine.

Results

Of the 446 samples positive for heroin metabolite, methadone was concomitantly used most frequently (26.7%) followed by cocaine (25.6%), oxycodone (24.2%), hydrocodone (16.4%), marijuana (11.6%), buprenorphine (4.9%), and methamphetamine (4.7%). Patients on oxycodone were twice as likely to test positive for heroin as those on hydrocodone (0.28% versus 0.14%). Cocaine was the most highly correlated with heroin use (20 times more likely than hydrocodone) followed by methamphetamine (14 times more likely), methadone (7.2 times more likely), buprenorphine (5.6 times more likely) and marijuana (3.7 times more likely). Regression analysis yielded a positive linear relationship between the frequency of heroin positive cases and morphine concentration.

Conclusions

Oxycodone was twice as likely to be concomitantly used with heroin as hydrocodone and may be considered a gateway drug as compared to hydrocodone to heroin use. The high correlations between heroin and methadone and heroin and buprenorphine are expected because they are used frequently in heroin cessation treatment, and patients positive for these agents should be more closely monitored for heroin use than those patients using other opiate medications and illicit drugs. The positive correlation between morphine and the heroin metabolite is expected if heroin use was more recent and thus, supports the validity of the study.