K2 Incidence and Trends of Driving Under the Influence (DUI) of Zolpidem: A Retrospective Study of DUI Cases From 2001 to 2014

Monica Jacobs, 12615 SW 256 Terrace, Homestead, FL 33032; and Lisa J. Reidy, PhD, Univ of Miami Forensic Tox Lab, 1600 NW 10th Avenue, RSMB R-5, Rm 7020A, Miami, FL 33136*

After attending this presentation, attendees will be informed of the incidence of DUI of zolpidem in DUI cases in Miami-Dade County, FL, from 2001 to 2014.

This presentation will impact the forensic science community by the increase and importance of zolpidem screening and confirmation in DUI cases.

Introduction: Zolpidem, currently a Schedule IV controlled substance under the Federal Controlled Substance Act, is not a controlled substance in Florida, rendering it difficult to charge drivers with DUI. The drug is an effective non-benzodiazepine sedative hypnotic which binds specifically to the $GABA_A$ receptor, which results in its sedative activity and therefore its central nervous system depressant properties. It has a rapid onset of action and short elimination half-life (average of 2.6 hours), which makes it ideal for the treatment of sleep disorders. Zolpidem may have a role in drug-impaired driving investigations since it has been shown that zolpidem can produce significant impaired coordinative, reactive, and cognitive skills such as erratic driving, slow and slurred speech, slow reflexes, disorientation, and confusion.

Objective: The purpose of this study was to investigate the trends of zolpidem use in drivers suspected of being under the influence, using biological samples (blood and urine) that had been submitted to the laboratory during the time period 2001-2014.

Materials and Methods: Blood samples from DUI drivers in Miami are first tested for the presence of alcohol by gas chromatography. In general, if a driver's Blood Alcohol content (BAC) is higher than 0.15g/100mL, no additional testing is performed. All urine and resulting blood samples are then tested for nine drug classes by Enzyme-Linked Immuno-Sorbent Assay (ELISA) (amphetamine (blood/urine cutoffs: 20/200ng/mL), methamphetamine (20/200ng/mL), benzodiazepine (20/100ng/mL), cocaine metabolite (20/150ng/mL), opiate (20/150ng/mL), oxycodone (20/100ng/mL), cannabis (2/20ng/mL), synthetic cannabinoids (20/10ng/mL), and zolpidem (5/25 ng/mL)) in blood and urine, respectively.

Urine and blood samples that screen as presumptive positive for zolpidem were subsequently confirmed by Gas Chromatography/Mass Spectrometry (GC/MS) using a basic drug screening and/or quantitated by utilizing a liquid-liquid alkaline extraction with analysis by GC/MS in Selective Ion Mode (SIM). The assay utilizes a five-point calibration curve (10-200ng/ml) alongside positive and negative controls. The method was validated in accordance with the Scientific Working Group for Forensic Toxicology (SWGTOX).

Results:

Year	Total number		% of cases
	Overall DUI cases	Zolpidem positive	
2001	885	3	<1
2002	946	3	<1
2003	700	5	<1
2004	653	4	<1
2005	520	4	<1
2006	522	4	<1
2007	647	9	1
2008	700	9	1
2009	640	14	2
2010	565	16	3
2011	506	9	1
2012	452	11	2
2013	403	8	2

2014	379	8	2

A total of 107 cases were positive for zolpidem during the 14-year period of this study. Overall, 80% of the zolpidem positive cases were identified in urine samples taken from suspected DUI drivers in Miami-Dade. The highest incidence of zolpidem positive cases was in the year of 2010 with a total of 16 samples. Blood quantitation values for zolpidem ranged from 12ng/mL to 560ng/mL (average=177ng/ml) in blood cases submitted.

Impairment profiles in the urine and blood cases in which zolpidem was detected included the presence of horizontal gaze nystagmus, lack of pupil convergence, reduced time estimation, and reduced pulse and blood pressure. Driving patterns ranged from falling asleep with the car stationary in the highway to the inability to maintain headway to failure to stop at intersections and collisions with oncoming traffic.

Conclusion: This study examined the incidence and trends of suspected human performance impairment cases involving zolpidem during 2001-2014. The incidence of urine DUI cases positive for zolpidem has increased over the past 14 years. The blood quantitation values demonstrated wide variability, with ten blood samples above the recommended therapeutic blood levels. Of interest, the United States Food and Drug Administration required lowering the recommended dose for zolpidem on January 13, 2013, due to the risk of next-morning impairment following its use. The failure to prosecute these cases in the state of Florida is of interest as zolpidem is shown to produce profound impairment in drivers under the influence of this medication.

Zolpidem, DUI, Incidence