Emerging Designer Drug Monograph

Revision Date: October 29, 2013

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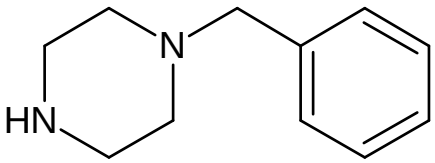
Drug Name: BZP

Synonyms: 1-benzylpiperazine, N-benzylpiperazine, 1-(phenylmethyl)piperazine, 4-benzylpiperazine

Structure:



Formula: $C_{11}H_{16}N_2$

Molecular Weight: 176.26

Pharmacological Drug Class: BZP is typically sold in a tablet or capsule form containing TFMPP as well (2). BZP is a controlled substance Schedule I, amphetamine like stimulant (5).

Metabolism: BZP is not typically metabolized, but rather excreted unchanged in the urine (5). TFMPP is extensively metabolized (1).

Blood Concentrations: Elliot and Smith reported blood concentration levels in fatalities the first being in a traffic accident where the person had not been known to be a user of BZP or TFMPP with the TFMPP blood concentration level of 0.05 mg/L in the presence of BZP at a blood concentration of 0.71 mg/L, ethanol blood concentration of 77 mg/dL, and ketamine blood concentration of 0.96 mg/L. In the urine his TFMPP concentration was 1.04 mg/L, BZP 15.73 mg/L, and other drugs found in the urine such as cannabinoids, cocaine, ephedrine, ketamine, and ethanol. The other fatal case involving TFMPP the 17 year old boy fell through a roof after having been at a party and was carrying several tablets that contained TFMPP and BZP. The blood concentration of TFMPP was 0.15 mg/L with BZP blood concentration of 1.39 mg/L, ethanol was also found in his system but no other drugs. His urine concentrations were TFMPP 0.92 mg/L, BZP 8.7 2mg/L (2). BZP blood concentrations ranged from 0.02 to 1.2 mg/L in living users (2). In Wood et al. the 3 cases studied; two 18 year old boys and one 19 year old boy all went to the emergency room after attending the same party where they ingested the same 4 tablets, each tablet was sold from a different person at the party. The boys thought the tablets were Ecstasy. They showed concentration range of TFMPP of 0.03-0.06 mg/L and BZP of 0.26-0.27 mg/L. Cannabinoids were found in one of the patients but that was the only other drug detected in the toxicology screening (8). In Elliot's review an author

studied 96 patients for 2 years and reported BZP concentrations between 0 and 6.29 mg/L with a mean of 0.68 mg/L. In another study BZP blood concentrations were reported as 1.3, 1.9, 1.9, and 2.5 mg/L with no other drugs present (1). In nonfatal cases reported blood concentrations of BZP and TFMPP concentrations as 0.32 mg/L and 0.08 mg/L, and in another case as 0.47 mg/L and 0.10 mg/L respectfully no data on other potential drugs present was available (1). In one nonfatal case BZP blood concentration was reported as 0.17 mg/L with MDMA and citalopram present (1). In fatal cases BZP blood concentrations as low as none detected but present in urine, and when detected in the blood < 0.3 mg/L and as high as 3.20 mg/L. Whereas in the TFMPP blood concentrations in the fatalities ranged from none detected but present in the urine, and when detected in the blood < 0.03 mg/L to 0.3 mg/L. In these cases BZP and TFMPP were found in the urine but not necessarily found in the blood (1). There were typically other drugs such as cocaine, MDMA, cannabis, alcohol, and several other drugs present. Many of these fatalities also have other causes that may be the cause of death such as hanging, heroin, or methadone use (1). In another case where a woman had multiple gunshot wounds as well as other drugs in her system had a TFMPP blood concentration levels measured at 1.1 mg/L but they could not determine the cause of death to be directly linked to the TFMPP overdose (3).

Effects and Toxicity: BZP is a stimulant drug with amphetamine like properties. The stimulant effects are indistinguishable from dexamphetamine but the intensity of the effects are one tenth the potency in BZP than in dexamphetamine. Typical BZP dose ranges from 50-200 mg (8). BZP in post-mortem cases have a BZP concentration of > 0.25 mg/L, TFMPP of 0.093 mg/L (7). TFMPP urine levels have been found to be >0.5 mg/L (3). Wood et al. described BZP concentrations to be 0.26-0.27 mg/L and TFMPP concentrations to be 0.03–0.06 mg/L. BZP is typically mixed with TFMPP, causing both the dopaminergic effects and the higher serotonin effects caused by the TFMPP. BZP has dopaminergic effects and to a lesser extent serotonin effects. BZP inhibits dopamine reuptake (5). There is an increase of the release of norepinephrine which increases blood pressure and heart rate. Symptoms of BZP when taken with other drugs such as MDMA and TFMPP include palpitations, anxiety, headache, vomiting, tachycardia, collapse, confusion, hypertension, and seizures. However, toxicity of BZP alone includes agitation, tachycardia, and seizures (2).

Analysis: BZP can be detected on amphetamine screens by ELISA assays with limited success (4). There is a specific ELISA assay for BZP that was developed by Rodrigues et al. it is sensitive and specific for BZP in urine and blood (4). It is also detected by GC/MS, GC/NPD, HPLC diode array UV detection (DAD), and LC/MS. The liquid chromatography methods can be used to differentiate individual piperazine isomers (5). An SPE method by Zaney et al. showed that SPE with LC/MS/MS is more efficient than LLE and drugs like BZP and TFMPP can now be detected (10). One study suggests that there is some cross reactivity seen with BZP and TFMPP on the CEDIA Amphetamine/Ecstasy assay (6).

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