

## Toxic Effects of Sexual Drug Overdose: Sildenafil (Viagra)

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**Abstract:** In today's world main problem adolescence consumption of drugs are increasing day by day. Sildenafil is the sexual drug. Sildenafil is the drug which to increase sexual power and improves flow of blood to the phallus (male reproductive part). It's most commonly found in the form of brand names are Viagra and Revatio. It can be administrated orally or injected directly into the veins. Sildenafil is an effective inhibitor of recurring guanosine monophosphate in the corpus cavernosum and consequently rises the penile reaction to sexual stimulus. Sildenafil also causes some side effect like headache, heartburn, flushed skin, visual disturbance, and dyspepsia. Sildenafil does not protect with sexually transmitted diseases like HIV, hepatitis B, AIDS etc. Sildenafil may effect severe organ like cardiovascular system, reproductive system, pulmonary hypertension, retinal dysfunction etc. Due to overdose of the sildenafil the person get heart attack, stroke, irregular heartbeats and death may also occur in rare cases. This paper aims about the detailed study of the sexual drug and the poisonous effects which is caused to the humans.

**Keywords:** sildenafil, sexual drug, Viagra, dyspepsia.

### 1. INTRODUCTION

Sildenafil is the sexual drug. Sildenafil is a new oral drug specially aimed at the cure of erectile dysfunction [1]. Sildenafil citrate is a discerning inhibitor of phosphodiesterase 5 (PDE5) and stayed the initial agent through this way of act for the cure of man erectile dysfunction [2]. Male erectile dysfunction (ED) is the determined or recurring incapability to reach, or to uphold till end of the sexual action, a suitable erection [3]. Sildenafil (Viagra) conventional Food and Drug Administration approval in March 1998 such as the earliest oral agent for erectile dysfunction [4]. Sildenafil workings such as a modest inhibitor of an enzyme of the phosphodiesterase type five class (PDE-5). Here are eleven forms of phosphodiesterase found over the body [5, 6]. Sildenafil is a weak vasodilator, resultant in lesser, transitory decreases in systolic (10 mmHg) and diastolic (7 mmHg) blood pressure (BP) when directed orally; no clinically important special effects on heart rate (HR) have been stated [7]. Sildenafil is quickly engrossed, by maximum plasma concentrations happening in one hour after oral admin then a mean fatal half-life of three to five hours [5]. Since the approval of sildenafil,

several information of unexpected death amid patients preserved by this drug have upraised about worries concerning its care in patients with coronary artery disease [8].

The furthestmost usually stated adverse effects of sildenafil are headache, gastroesophageal reflux, dyspepsia, facial flushing, nasal congestion, pupil sparing, and third nerve palsy [9, 10]. Described cardiovascular side properties in the usual healthy population are naturally slight and related with vasodilatation (ie, headache, flushing, and small decreases in systolic and diastolic blood pressures). However, although their incidence is small, serious cardiovascular events, including significant hypotension, can occur in certain populations at risk [11]. The blood pressure dropping effect of sildenafil is uncertain and therefore improbable to activate a reflex heart rate response. Certainly, a mild sympathetic reaction straight to the vasculature might remain accountable for the upkeep of blood pressure deprived of activating a impulse tachycardia [12]. Though, with pharmacological efforts resultant in larger reduction of blood pressure as understood by the nitrate contact study here is a minor impulse reaction in heart rate in demand toward uphold blood pressure



the regulation, making and secretion of sex hormones [33]. Severe stimulus of testosterone secretion with management of human chorionic gonadotropin (HCG), a complex through luteinizing hormone-like activities, produces only a reduced reaction in uremic men [34].

### 2.3.2. *Effect of Retinal Dysfunction*

Though the part of sildenafil in erectile dysfunction exists well understood and has been clear in feature, optical effect of sildenafil are still deficient. There are about reports in the literature on the retinal side-effects of sildenafil [35, 36]. Supervision of PDE5 inhibitors has been connected with visual turbulences such as blue tinge, increased glare of coloured lights and blurry vision; but, the precise device of these disorders takes not remained definitively clarified [37]. The PDE5 enzyme presented a extensive appearance on retinal and choroidal vessels, confirming the straight influence of PDE5 inhibitors on their enlargement. Lastly, surprisingly, we establish the occurrence of the PDE5 enzyme on ganglion (III neuron) and bipolar cell layers (II neuron). Ganglion and bipolar cell layers performs as a filter in the visual signal, giving a first codification of the neural signal [38-41].

### 2.3.3. *Effect on Pulmonary Hypertension in Human Health*

Pulmonary hypertension (PH) of unidentified etiology or related with connective tissue syndrome is a lethal disease with few medical treatments [42]. Patients with liver diseases are at hazard of emerging pulmonary vascular complications [43]. Sildenafil has also been reported to increase arterial Po<sub>2</sub> [44] and recover bodily performance in numerous circumstances of severe pulmonary hypertension, but no education has explored the consequence of a numerous daytime action by sildenafil on these variables in usual focusses bare to elevation circumstances [45, 46, 47]. Approximately medical doctor have initiated by sildenafil as another to, and in mixture with, in the initial organisation of PAH, but its residence is inaccurate [48]. Headache existence a probable adversative outcome of sildenafil, though, its likely upsurge in preserved issues might have risk a likely helpful outcome on general AMS score since of a improved blood oxygenation. The suggestion of sildenafil in the action of HAPE has not stayed addressed in the current study since nobody of the issues agonised after this severe disorder. The valued effect on Ppa powerfully advises, though, that

this drug could be extremely effective in this disorder, deprived of adverse systemic effect, opposing to the typically proposed calcium blockers [49, 50]. A few uncontrolled clinical studies have suggested that combinations of aerosolised iloprost and sildenafil, as fine as aerosolised iloprost and are harmless and effective in selected patients with liberal disease in spite of prostanoid cure [51,52]. Preclinical studies have revealed that sildenafil selectively decreases pulmonary artery pressure with slight effect on systemic BP. Randomised, double blind, crossover design studies support these findings; sildenafil improved 6-min walking distance and reduced mean pulmonary arterial systolic pressure in patients with primary pulmonary hypertension [53, 54].

### 2.3.4. *Effect on Cardiovascular System*

Males through cardiovascular illness are further possible to have erectile dysfunction than the overall male inhabitants since together circumstances share a number of hazard influences [55]. Different cAMP-specific PDE-3 inhibitors (milrinone, vesnarinone, and enoximone) that rise long-standing death in patients with heart failure [19, 20], sildenafil stays extremely selective (4000-fold) for human PDE-5 over human PDE-3 and has not been found to elevate cAMP [56]. Anecdotal information of cardiovascular deaths associated with sildenafil use produced substantial worry in the medicinal public in months of the drug's endorsement in late March 1998. Meanwhile formerly, the FDA has complete obtainable information on deaths in patients receiving sildenafil among the period of its endorsement and mid-November 1998 [57]. Besides, PDE5 is not present in cardiac myocytes, and sildenafil has been exposed to take no straight inotropic special effects on dog trabeculae muscle (Pfizer, unpublished data). Though, sildenafil has not been examined widely in heart failure patients [58].

## 3. DISCUSSION

Sildenafil is a sexual dysfunction and a psychotropic drug which is used in the form of antidepressants. This was a major essential growing problem that provides us to keep the use of sildenafil in differential for any patient who present with symptoms described about. Human health is directly affected by Neurological dysfunction. Some study also shown that the sildenafil uses in the sexual assault cases by giving the drug forcefully to the teenagers so, that they go in the unconscious

state. This study shows that sildenafil, directed in particular oral dosages, is in effect in improving erectile activity in patients with male erectile dysfunction for which there is no recognised biological cause. Due to the overdose of the sildenafil drug, the person occur various disease like strokes, heart failure and death may be also occur. The absence of scientific study in human awareness about the hazard of sildenafil and adolescence will unceasingly use and mainly by those who have already experienced the effect of sildenafil.

#### 4. CONCLUSION

Sildenafil is an operational oral drug for erectile dysfunction. The toxicologist have detected the minor and major effects on various parts of the human body. Analytical techniques which is use to detect the concentration of the drug from the body are HPLC, spectrophotometer, GC-MS, LC-MS etc. Additional connected study decided out in the upcoming with sample confined in different conditions, will allow a quantitative report of the drug in these samples to be defined at the national level. The occurrence of contrary proceedings owed to sildenafil may be greater than primarily described.

#### REFERENCES

- [1] Burls, A., Clarke, W., Gold, L., & Simpson, S. (2001). Sildenafil: an oral drug for the treatment of male erectile dysfunction. *BRITISH JOURNAL OF CLINICAL GOVERNANCE-BRADFORD-*, 6(1), 55-56.
- [2] Dunn, P. J., Galvin, S., & Hettenbach, K. (2004). The development of an environmentally benign synthesis of sildenafil citrate (Viagra™) and its assessment by Green Chemistry metrics. *Green Chemistry*, 6(1), 43-48.
- [3] American Psychiatric Association. *Diagnostic and statistical manual of mental disorders (Fourth edition; DSM-IV)*. Washington,DC: APA, 1994;
- [4] Viagra (sildenafil citrate) package insert, Pfizer Inc.
- [5] Boolell M, Allen MJ, Ballard SA, et al. Sildenafil: an orally active type 5 cyclic GMP specific phosphodiesterase inhibitor for the treatment of penile erectile dysfunction. *Int J Impot Res*. 1996; 8:47-52.
- [6] Uckert S, Kuthe A, Stief CG, et al. Phosphodiesterase isoenzymes as pharmacological targets in the treatment of male erectile dysfunction. *World J Urol*. 2001; 19:14-22.
- [7] Zusman RM, Prisant LM, Brown MJ. Effect of sildenafil citrate on blood pressure and heart rate in men with erectile dysfunction taking concomitant antihypertensive medications. *J Hypertens* 2000; 18:1865-9.
- [8] Kloner RA (2000). Cardiovascular risk and sildenafil. *American Journal of Cardiology*, 86: 57F-61F (4).
- [9] Boolell M, Allen MJ, Ballard SA, Gepi-Attee S, Muirhead GJ, Naylor AM, et al. Sildenafil: an orally active type 5 cyclic GMP-specific phosphodiesterase inhibitor for the treatment of penile erectile dysfunction. *Int J Impot Res* 1996; 8:47-52.
- [10] Donahue SP, Taylor RJ. Pupil-sparing third nerve palsy associated with sildenafil citrate (Viagra). *Am J Ophthalmol* 1998; 126:476-7.
- [11] Cheitlin, M. D., Hutter, A. M., Brindis, R. G., Ganz, P., Kaul, S., Russell, R. O., & Fisher, J. D. (1999). Use of sildenafil (Viagra) in patients with cardiovascular disease. *Journal of the American College of Cardiology*, 33(1), 273-282.
- [12] Phillips BG, Kato M, Pesek CA et al. Sympathetic activation by sildenafil. *Circulation* 2000; 102:3068-73.
- [13] Oliver JJ, Bell K, Leckie SM, Webb DJ. Interaction between glyceryl trinitrate and sildenafil citrate (VIAGRA) may last less than 4 h. To be presented at: World Congress of the International Society for Sexual and Impotence Research; September 22-26, 2002; Montreal, Canada.
- [14] Herrmann, H. C., Chang, G., Klugherz, B. D., & Mahoney, P. D. (2000). Hemodynamic effects of sildenafil in men with severe coronary artery disease. *New England Journal of Medicine*, 342(22), 1622-1626.
- [15] Saenz de Tejada I, Goldstein I, Blanco R, Cohen RA, Krane RJ. Smooth muscle of the corpora cavernosae: role in penile erection. *Surg Forum* 1985; 36: 623-4 (7).
- [16] Aboseif SR, Lue TF. Haemodynamics of penile erection. *Urol Clin North Am* 1988; 15: 1-7 (8).
- [17] Pfizer Viagra (sildenafil citrate): Information for Health Professionals. Available at: <http://www.viagra.com>. Accessed March 15, 2000 (1).
- [18] Goldstein I, Lue TF, Padma-Nathan H, et al, for the Sildenafil Study Group: Oral sildenafil in the treatment of erectile dysfunction. *N Engl J Med* 338: 1397-1404, 1998 (3).
- [19] Morales A, Gingell C, Collins M, et al: Clinical safety of oral sildenafil citrate (Viagra) in the treatment of erectile dysfunction. *Int J Impot Res* 10: 69-74, 1998 (4).
- [20] Umrani, D. N., & Goyal, R. K. (1999). Pharmacology of sildenafil citrate. *Indian journal of physiology and pharmacology*, 43, 160-164.
- [21] Fendrich, M., Johnson, T. (2005). Editors' introduction to this special issue on club drug epidemiology. *Substance Use & Misuse* 40:1179-1184.

- [22] Maxwell, J. C. (2005). Party drugs: properties, prevalence, patterns, and problems. *Substance Use & Misuse* 40:1203–1240.
- [23] Degenhardt, L., Copeland, J., Dillon, P. (2005). Recent trends in the use of “clubdrugs”: an Australian review. *Substance Use & Misuse* 40:1241–1256.
- [24] Schwartz RH, Miller NS. MDMA (ecstasy) and the rave: a review. *Pediatrics* 1997; 100:705–708 (1).
- [25] Aldridge J, Measham F. Sildenafil (Viagra) is used as a recreational drug in England. *BMJ* 1999; 318:669 (11).
- [26] Henry JA, Jeffreys KJ, Dawling S. Toxicity and deaths from 3, 4- methylenedioxymethamphetamine (“Ecstasy”). *Lancet* 1992; 340:384– 387 (12).
- [27] Henry J, Hill I. Fatal interaction between ritonavir and MDMA. *Lancet* 1998; 325:1751–1752 (13).
- [28] Harrington R, Woodward J, Hooten T, et al. Life-threatening interactions between HIV-1 protease inhibitors and the illicit drugs MDMA and gamma-hydroxybutyrate. *Arch Intern Med* 1999; 159:2221–2224 (14).
- [29] The National Drug Control Strategy: 2000 annual report. Washington, DC: Office of National Drug Control Policy, 2000 (4).
- [30] Goldstein T, Feldman R. Oral sildenafil for the treatment of erectile dysfunction. *Dr J Urol* 1997; 80: 91.
- [31] Cheitlin, M. D., Hutter, A. M., Brindis, R. G., Ganz, P., Kaul, S., Russell, R. O., & Fisher, J. D. (1999). Use of sildenafil (Viagra) in patients with cardiovascular disease. *Journal of the American College of Cardiology*, 33(1), 273–282.
- [32] Terrett NK, Bell AS, Brown D, et al. A potent and selective inhibitor of type 5 cGMP phosphodiesterase with utility for the treatment of male erectile dysfunction. *Bioorg Med Chem Lett* 1996; 1819–24.
- [33] Klüver H, Bucy PC, Klüver H, Bucy PC. Preliminary analysis of functions of the temporal lobes in monkeys 1939. *J Neuropsychiatry Clin Neurosci* 1997; 9:606–20.
- [34] Stewart-Bentley M, Gans D, Horton R: Regulation of gonadal function in uremia. *Metabolism* 23: 1065–1072, 1974.
- [35] Vobig MA, Klotz T, Staak M, et al. Retinal side effects of sildenafil. *Lancet* 1999; 353:375 (5).
- [36] Marmor MF. Sildenafil (Viagra) and ophthalmology. *Arch Ophthalmol* 1999; 117; 518 (6).
- [37] Laties A, Sharlip I. Ocular safety in patients using sildenafil citrate therapy for erectile dysfunction. *J Sex Med* 2006; 3: 12–27 (5).
- [38] Neves G, Lagnado L. The retina. *Curr Biol* 1999; 9: R674–R677.
- [39] Trexler EB, Li W, Massey SC. Simultaneous contribution of two rod pathways to All amacrine and cone bipolar cell light responses. *J Neurophysiol* 2005; 93: 1476–1485.
- [40] Dacey DM, Liao HW, Peterson BB, Robinson FR, Smith VC, Pokorny J et al. Melanopsin-expressing ganglion cells in primate retina signal colour and irradiance and project to the LGN. *Nature* 2005; 17: 749–754.
- [41] Nirenberg S, Carcieri SM, Jacobs AL, Lathman PE. Retinal ganglion cells act largely as independent encoders. *Nature* 2001; 411: 698–701.
- [42] Runo JR, Loyd JE. Primary pulmonary hypertension. *Lancet* 2003; 361: 1533–1544.
- [43] Rodriguez-Roisin R, Krowka MJ, Herve ´ P, Fallon MB, on behalf of the ERS Task Force Pulmonary-Hepatic Vascular Disorders (PHD) Scientific Committee. Pulmonary Hepatic vascular Disorders (PHD). *Eur Respir J* 2004; 24: 861–880 (1).
- [44] Ghofrani HA, Wiedemann R, Rose F, Schermuly RT, Olschewski H, Weissmann N, Gunther A, Walmrath D, Seeger W, Grimminger F. Sildenafil for treatment of lung fibrosis and pulmonary hypertension: a randomised controlled trial. *Lancet* 2002; 360:895–900 (17).
- [45] Ghofrani HA, Reichenberger F, Kohstall MG, Mrosek EH, Seeger T, Olschewski H, Seeger W, Grimminger F. Sildenafil increased exercise capacity during hypoxia at low altitudes and at Mount Everest base camp: a randomized, double-blind, placebo-controlled crossover trial. *Ann Intern Med* 2004; 141:169–177 (14).
- [46] Michelakis ED, Tymchak W, Noga M, Webster L, Wu XC, Lien D, Wang SH, Modry D, Archer SL. Long-term treatment with oral sildenafil is safe and improves functional capacity and hemodynamics in patients with pulmonary arterial hypertension. *Circulation* 2003; 108:2066–2069 (15).
- [47] Ghofrani HA, Schermuly RT, Rose F, Wiedemann R, Kohstall MG, Kreckel A, Olschewski H, Weissmann N, Enke B, Ghofrani S, et al. Sildenafil for long-term treatment of nonoperable chronic thromboembolic pulmonary hypertension. *Am J Respir Crit Care Med* 2003; 167: 1139–1141 (18).
- [48] Hoeper MM, Faulenbach C, Golpon H, Winkler J, Welte T, Niedermeyer J. Combination therapy with bosentan and sildenafil in idiopathic pulmonary arterial hypertension. *Eur Respir J* 2004; 24:1007–1010.
- [49] Oelz O, Ritter M, Jenni R, Maggiorini M, Waber U, Vock P, Baertsch P. Nifedipine for high altitude pulmonary edema. *Lancet* 1989; 8674:1241– 1244 (6).

- [50] Ba'rtsch P, Maggiorini M, Ritter M, Noti C, Vock P, Oelz O. Prevention of high-altitude pulmonary edema by nifedipine. *N Engl J Med* 1991; 325:1284–1289 (7).
- [51] Ghofrani HA, Rose F, Schermuly RT, et al. Oral sildenafil as long-term adjunct therapy to inhaled iloprost in severe pulmonary arterial hypertension. *J Am Coll Cardiol* 2003; 42: 158–164 (15).
- [52] Hoepfer MM, Taha N, Bekjarova A, Gatzke R, Spiekerkoetter E. Bosentan treatment in patients with primary pulmonary hypertension receiving nonparenteral prostanoids. *Eur Respir J* 2003; 22: 330–334 (16).
- [53] Sastry BK, Narasimhan C, Reddy NK et al. A study of clinical efficacy of sildenafil in patients with primary pulmonary hypertension. *Indian Heart J* 2002; 54: 410–4.
- [54] Sastry BK, Narasimhan C, Reddy NK et al. Clinical efficacy of sildenafil in primary pulmonary hypertension: a randomized, placebo-controlled, double-blind, crossover study. *J Am Coll Cardiol* 2004; 43: 1149–53.
- [55] Hatzichristou, D. G. (2002). Sildenafil citrate: lessons learned from 3 years of clinical experience. *International journal of impotence research*, 14(S1), S43.
- [56] Wallis RM. The pharmacology of sildenafil, a novel and selective inhibitor of phosphodiesterase (PDE) type 5. *Nippon Yakurigaku Zasshi* 1999; 114(Suppl 1):22P–26P (21).
- [57] Food and Drug Administration. Summary of reports of death in Viagra users received from marketing (late March) through mid-November 1988. FDA website: [www.FDA.gov](http://www.FDA.gov).
- [58] Cheitlin, M. D., Hutter, A. M., Brindis, R. G., Ganz, P., Kaul, S., Russell, R. O., & Fisher, J. D. (1999). Use of sildenafil (Viagra) in patients with cardiovascular disease. *Journal of the American College of Cardiology*, 33(1), 273–282.

**Citation:** Rohit Kumar Verma, Mahipal Singh Sankhla, Rajeev Kumar. *Toxic Effects of Sexual Drug Overdose: Sildenafil (Viagra)*. *ARC Journal of Forensic Science*. 2019 4(1): 26-31. <http://dx.doi.org/10.20431/2456-0049.0401003>

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