



## Substance Addiction and Cardiovascular Effects

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### INTRODUCTION

The term substance emphasizes addictive substances. The terms “drug”, “stimulant”, addictive substance or “psychoactive substance” are also used to describe the concept of the substance. Drugs that cause mental and physical reactions in their absence and lead to personal or social problems are toxic substances the use, possession, and sale of which are prohibited by law (1). Generally, an uncontrollable desire for an object, a person, or any entity or the state of being under the influence of another was defined as addiction (2). Substance addiction was defined as a brain disease characterized by the desire to take certain substances continuously or periodically and certain behavioral patterns to feel the pleasures of a substance or to avoid the uneasiness caused by the absence of a drug due to the effect of that drug on the brain (3).

Currently, the use of addictive substances is extremely common globally. It was estimated that drug use is seen one out of every four people at some points in their life in developed countries. It is known that the correlation between substance abuse and morbidity and mortality is significant in the general population (4).

Cardiovascular diseases are the leading cause of death worldwide. Although it varies throughout the geography, the cardiovascular disease incidence has been increasing globally due to the risk factors such as age, obesity, high cholesterol, and smoking (5,6,7). Currently, substance addiction is considered as a cardiovascular disease risk (8). Substances have multiple effects on cardiovascular

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dia, hypotension, hypertension, changes in ECG, dilated cardiomyopathy, heart failure, bacterial endocarditis, life-threatening supraventricular and ventricular arrhythmias, myocardial ischemia, infarction, and death.

## REFERENCES

1. Güngör, D. (2018). Sentetik uyuşturucular: Amfetamin örneği. *Güvenlik Çalışmaları Dergisi*, 20(1), 105-112.
2. Ögel, K., Tamar, D.K.A., et al. (Eds.). (1998). *Alkol ve Madde Kullanım Bozuklukları El Kitabı*. Bakırköy Mental and Neurological Diseases Hospital, Amatem, Istanbul.
3. Uzbay, İ. T. (2009). Madde Bağımlılığının Tarihiçesi, Tanımı, Genel Bilgiler ve Bağımlılık Yapıpan Maddeler, *Türk Eczacılar Birliği Meslek İçi Sürekli Eğitim Dergisi*, 21(22), 16-33.
4. Hay, S. I., Abajoir, A. A., Abate, K. H., Abbafati, C., Abbas, K.M., Abd-Allah, F. & GBD 2016 DALYs and HALE Collaborators. (2017). Global, regional, and national disability-adjusted life-years (DALYs) for 333 diseases and injuries and healthy life expectancy (HALE) for 195 countries and territories, 1990–2016: a systematic analysis for the Global Burden of Disease Study 2016. *Lancet*, 390, 1260-1344.
5. Fox, K. A., Dabbous, O. H., Goldberg, R. J., Pieper, K. S., Eagle, K. A., Van de Werf, F., Avezum, A., Goodman, S. G., Flather, M. D., Anderson, F. A., Jr, & Granger, C. B. (2006). Prediction of risk of death and myocardial infarction in the six months after presentation with acute coronary syndrome: prospective multinational observational study (GRACE). *BMJ* (Clinical research ed.), 333(7578), 1091. <https://doi.org/10.1136/bmj.38985.646481.55>
6. Stevens, J., Erber, E., Truesdale, K. P., Wang, C. H., & Cai, J. (2013). Long- and short-term weight change and incident coronary heart disease and ischemic stroke: the Atherosclerosis Risk in Communities Study. *American journal of epidemiology*, 178(2), 239–248. <https://doi.org/10.1093/aje/kws461>
7. Mallaina, P., Lionis, C., Rol, H., Imperiali, R., Burgess, A., Nixon, M., & Malvestiti, F. M. (2013). Smoking cessation and the risk of cardiovascular disease outcomes predicted from established risk scores: results of the Cardiovascular Risk Assessment among Smokers in Primary Care in Europe (CV-ASPIRE) study. *BMC public health*, 13, 362. <https://doi.org/10.1186/1471-2458-13-362>
8. Sarımehtemtoğlu, A. C., & Helvacı, A. (2014). Madde Bağımlılığı ve Kardiyovasküler Sistem. *Okmeydanı Tıp Dergisi*, 30(2), 99-103. <https://doi.org/10.5222/otd.supp2.2014.099>
9. Nishimura, M., Bhatia, H., Ma, J., Dickson, S. D., Alshawabkeh, L., Adler, E., Maisel, A., Criqui, M. H., Greenberg, B., & Thomas, I. C. (2020). The Impact of Substance Abuse on Heart Failure Hospitalizations. *The American journal of medicine*, 133(2), 207–213.e1. <https://doi.org/10.1016/j.amjmed.2019.07.017>
10. Nawrot, T. S., Perez, L., Künzli, N., Munters, E., & Nemery, B. (2011). Public health importance of triggers of myocardial infarction: a comparative risk assessment. *Lancet (London, England)*, 377(9767), 732–740. [https://doi.org/10.1016/S0140-6736\(10\)62296-9](https://doi.org/10.1016/S0140-6736(10)62296-9)
11. Atakan Z. (2012). Cannabis, a complex plant: different compounds and different effects on individuals. *Therapeutic advances in psychopharmacology*, 2(6), 241–254. <https://doi.org/10.1177/2045125312457586>
12. Singh, A., Saluja, S., Kumar, A., Agrawal, S., Thind, M., Nanda, S., & Shirani, J. (2018). Cardiovascular Complications of Marijuana and Related Substances: A Review. *Cardiology and therapy*, 7(1), 45–59. <https://doi.org/10.1007/s40119-017-0102-x>
13. DeFilippis, E. M., Bajaj, N. S., Singh, A., Malloy, R., Givertz, M. M., Blankstein, R., Bhatt, D. L.,

- & Vaduganathan, M. (2020). Marijuana Use in Patients With Cardiovascular Disease: JACC Review Topic of the Week. *Journal of the American College of Cardiology*, 75(3), 320–332. <https://doi.org/10.1016/j.jacc.2019.11.025>
14. Pacher, P., Steffens, S., Haskó, G., Schindler, T. H., & Kunos, G. (2018). Cardiovascular effects of marijuana and synthetic cannabinoids: the good, the bad, and the ugly. *Nature reviews. Cardiology*, 15(3), 151–166. <https://doi.org/10.1038/nrcardio.2017.130>
  15. Shayesteh, M. R. H., Haghi-Aminjan, H., Mousavi, M. J., Momtaz, S., & Abdollahi, M. (2019). The Protective Mechanism of Cannabidiol in Cardiac Injury: A Systematic Review of Non-Clinical Studies. *Current pharmaceutical design*, 25(22), 2499–2507. <https://doi.org/10.2174/2210327909666190710103103>
  16. Garza-Cervantes, J. A., Ramos-Gonzalez, M., Lozano, O., Jerjes-Sanchez, C., & Garcia-Rivas, G. (2020). Therapeutic applications of cannabinoids in cardiomyopathy and heart failure. *Oxidative Medicine and Cellular Longevity*, 2020, 4587024. <https://doi.org/10.1155/2020/4587024>
  17. Benowitz, N. L., Rosenberg, J., Rogers, W., Bachman, J., & Jones, R. T. (1979). Cardiovascular effects of intravenous delta-9-tetrahydrocannabinol: autonomic nervous mechanisms. *Clinical pharmacology and therapeutics*, 25(4), 440–446. <https://doi.org/10.1002/cpt1979254440>
  18. Gunawardena, M. D., Rajapakse, S., Herath, J., & Amarasena, N. (2014). Myocardial infarction following cannabis induced coronary vasospasm. *BMJ case reports*, 2014, bcr2014207020. <https://doi.org/10.1136/bcr-2014-207020>
  19. Casier, I., Vanduyhoven, P., Haine, S., Vrints, C., & Jorens, P. G. (2014). Is recent cannabis use associated with acute coronary syndromes? An illustrative case series. *Acta cardiologica*, 69(2), 131–136. <https://doi.org/10.1080/ac.69.2.3017293>
  20. Frost, L., Mostofsky, E., Rosenbloom, J. I., Mukamal, K. J., & Mittleman, M. A. (2013). Marijuana use and long-term mortality among survivors of acute myocardial infarction. *American heart journal*, 165(2), 170–175. <https://doi.org/10.1016/j.ahj.2012.11.007>
  21. DeFilippis, E. M., Singh, A., Divakaran, S., Gupta, A., Collins, B. L., Biery, D., Qamar, A., Fatima, A., Ramsis, M., Pipilas, D., Rajabi, R., Eng, M., Hainer, J., Klein, J., Januzzi, J. L., Nasir, K., Di Carli, M. F., Bhatt, D. L., & Blankstein, R. (2018). Cocaine and Marijuana Use Among Young Adults With Myocardial Infarction. *Journal of the American College of Cardiology*, 71(22), 2540–2551. <https://doi.org/10.1016/j.jacc.2018.02.047>
  22. Kalla, A., Krishnamoorthy, P. M., Gopalakrishnan, A., & Figueredo, V. M. (2018). Cannabis use predicts risks of heart failure and cerebrovascular accidents: results from the National Inpatient Sample. *Journal of cardiovascular medicine (Hagerstown, Md.)*, 19(9), 480–484. <https://doi.org/10.2459/JCM.0000000000000681>
  23. Nogi, M., Fergusson, D., & Chiaco, J. M. (2014). Mid-ventricular variant takotsubo cardiomyopathy associated with Cannabinoid Hyperemesis Syndrome: a case report. *Hawai'i journal of medicine & public health : a journal of Asia Pacific Medicine & Public Health*, 73(4), 115–118.
  24. Singh, A., Fegley, M., Mana, Y., & Adrawal, S. (2016). Marijuana (cannabis) use is an independent predictor of stress cardiomyopathy in younger men. *Circulation*, 134(Suppl 1), A14100.
  25. Kariyanna, P. T., Jayarangaiah, A., Singh, N., Song, T., Soroka, S., Amarnani, A., Ray, J., & McFarlane, S. I. (2018). Marijuana induced myocarditis: a new entity of toxic myocarditis. *American Journal of Medical Case Reports*, 6(9), 169–172.
  26. Korantzopoulos P. (2014). Marijuana smoking is associated with atrial fibrillation. *The American journal of cardiology*, 113(6), 1085–1086. <https://doi.org/10.1016/j.amjcard.2014.01.001>
  27. Desai, R., Patel, U., Deshmukh, A., Sachdeva, R., & Kumar, G. (2018). Burden of arrhythmia in recreational marijuana users. *International journal of cardiology*, 264, 91–92. <https://doi.org/10.1016/j.ijcard.2018.03.113>
  28. Baranchuk, A., Johri, A. M., Simpson, C. S., Methot, M., & Redfearn, D. P. (2008). Ventricular

- fibrillation triggered by marijuana use in a patient with ischemic cardiomyopathy: a case report. *Cases journal*, 1(1), 373. <https://doi.org/10.1186/1757-1626-1-373>
29. Yargıç, İ. (2013). Sentetik kannabinoidler. *Proceedings of the Yeni Nesil Psiko-Aktif Maddeler Sempozyumu*, Y. Küçük (Ed). Forensic Medicine Institute, Istanbul.
  30. Pertwee R. G. (1997). Pharmacology of cannabinoid CB1 and CB2 receptors. *Pharmacology & therapeutics*, 74(2), 129–180. [https://doi.org/10.1016/s0163-7258\(97\)82001-3](https://doi.org/10.1016/s0163-7258(97)82001-3)
  31. Winstock, A. R., & Barratt, M. J. (2013). Synthetic cannabis: a comparison of patterns of use and effect profile with natural cannabis in a large global sample. *Drug and alcohol dependence*, 131(1-2), 106–111. <https://doi.org/10.1016/j.drugalcdep.2012.12.011>
  32. Liechti M. (2015). Novel psychoactive substances (designer drugs): overview and pharmacology of modulators of monoamine signaling. *Swiss medical weekly*, 145, w14043. <https://doi.org/10.4414/smw.2015.14043>
  33. Parlakpınar, H. , Celbis, O. , Ozhan, O. , Petekkaya, S. , Samdancı, E. , Ermis, N. , Koparır, P. , Soyly, O. & Acet, A. (2016). Cardiovascular effects of JWH-018 from synthetic cannabinoids. *Medicine Science* , 5 (4) , 1049-1054.
  34. Fattore, L., & Fratta, W. (2011). Beyond THC: The New Generation of Cannabinoid Designer Drugs. *Frontiers in behavioral neuroscience*, 5, 60. <https://doi.org/10.3389/fnbeh.2011.00060>
  35. TUBİM. (2013). *Emniyet Genel Müdürlüğü Kaçakçılık ve Organize Suçlarla Mücadele Daire Başkanlığı EMCDDA 2013 Ulusal Raporu (2012 Yılı Verileri): Reitox Ulusal Temas Noktası Türkiye: Yeni Gelişmeler, Trendler, Seçilmiş Konular*. Ankara, Türkiye Uyuşturucu ve Uyuşturucu Bağımlılığı İzleme Merkezi.
  36. TUBİM. (2014). *Emniyet Genel Müdürlüğü Kaçakçılık ve Organize Suçlarla Mücadele Daire Başkanlığı EMCDDA 2014 Ulusal Raporu (2013 Yılı Verileri) : Reitox Ulusal Temas Noktası Türkiye: Yeni Gelişmeler, Trendler, Seçilmiş Konular*. Ankara, Türkiye Uyuşturucu ve Uyuşturucu Bağımlılığı İzleme Merkezi.
  37. Cohen, J., Morrison, S., Greenberg, J., & Saidinejad, M. (2012). Clinical presentation of intoxication due to synthetic cannabinoids. *Pediatrics*, 129(4), e1064–e1067. <https://doi.org/10.1542/peds.2011-1797>
  38. Brewer, T. L., & Collins, M. (2014). A review of clinical manifestations in adolescent and young adults after use of synthetic cannabinoids. *Journal for specialists in pediatric nursing: JSPN*, 19(2), 119–126. <https://doi.org/10.1111/jspn.12057>
  39. Çınar, R., & Gündüz Çınar, Ö. (2012). Kannabinoid tip 1 reseptör (CB1) ve terapötik yaklaşımlara genel bakış-2. *Marmara Üniversitesi Sağlık Bilimleri Enstitüsü Dergisi*, 1,149-154.
  40. Gurdal, F., Asirdizer, M., Aker, R. G., Korkut, S., Gocer, Y., Kucukbrahimoglu, E. E., & Ince, C. H. (2013). Review of detection frequency and type of synthetic cannabinoids in herbal compounds analyzed by Istanbul Narcotic Department of the Council of Forensic Medicine, Turkey. *Journal of forensic and legal medicine*, 20(6), 667–672. <https://doi.org/10.1016/j.jflm.2013.03.041>
  41. Schneir, A. B., Cullen, J., & Ly, B. T. (2011). “Spice” girls: synthetic cannabinoid intoxication. *The Journal of emergency medicine*, 40(3), 296–299. <https://doi.org/10.1016/j.jemermed.2010.10.014>
  42. Vandrey, R., Dunn, K. E., Fry, J. A., & Girling, E. R. (2012). A survey study to characterize use of Spice products (synthetic cannabinoids). *Drug and alcohol dependence*, 120(1-3), 238–241. <https://doi.org/10.1016/j.drugalcdep.2011.07.011>
  43. İbiloğlu A. O., Atlı A., & Güneş M. (2017). Sentetik Kannabinoidler. *Psikiyatriye Güncel Yaklaşımlar*, 9(3), 317-328.
  44. McKeever, R. G., Vearrier, D., Jacobs, D., LaSala, G., Okaneku, J., & Greenberg, M. I. (2015). K2--not the spice of life; synthetic cannabinoids and ST elevation myocardial infarction: a case report. *Journal of medical toxicology : official journal of the American College of Medical*

- Toxicology*, 11(1), 129–131. <https://doi.org/10.1007/s13181-014-0424-1>
45. Hoyte, C. O., Jacob, J., Monte, A. A., Al-Jumaan, M., Bronstein, A. C., & Heard, K. J. (2012). A characterization of synthetic cannabinoid exposures reported to the National Poison Data System in 2010. *Annals of emergency medicine*, 60(4), 435–438. <https://doi.org/10.1016/j.annemergmed.2012.03.007>
  46. Harris, C. R., & Brown, A. (2013). Synthetic cannabinoid intoxication: a case series and review. *The Journal of emergency medicine*, 44(2), 360–366. <https://doi.org/10.1016/j.jemermed.2012.07.061>
  47. Sasaki, C., Saito, T., Shinozuka, T. et al. A case of death caused by abuse of a synthetic cannabinoid N-1-naphthalenyl-1-pentyl-1H-indole-3-carboxamide. *Forensic Toxicology*, 33, 165–169 (2015). <https://doi.org/10.1007/s11419-014-0246-5>
  48. Cornish, J. W., & O'Brien, C. P. (1996). Crack cocaine abuse: an epidemic with many public health consequences. *Annual review of public health*, 17, 259–273. <https://doi.org/10.1146/annurev.pu.17.050196.001355>
  49. Eged, M., & Davis, G. K. (2005). Cocaine and the heart. *Postgraduate medical journal*, 81(959), 568–571. <https://doi.org/10.1136/pgmj.2004.028571>
  50. De Giorgi, A., Fabbian, F., Pala, M., Bonetti, F., Babini, I., Bagnaresi, I., Manfredini, F., Portaluppi, F., Mikhailidis, D. P., & Manfredini, R. (2012). Cocaine and acute vascular diseases. *Current drug abuse reviews*, 5(2), 129–134. <https://doi.org/10.2174/1874473711205020129>
  51. Drug Abuse Warning Network, 2011: National Estimates of Drug-Related Emergency Department Visits. *U.S. Department of Health and Human Services Substance Abuse and Mental Health Services Administration Center for Behavioral Health Statistics and Quality*. <https://www.samhsa.gov/data/sites/default/files/DAWN2k11ED/DAWN2k11ED/DAWN2k11ED.pdf>
  52. Kim, S. T., & Park, T. (2019). Acute and Chronic Effects of Cocaine on Cardiovascular Health. *International journal of molecular sciences*, 20(3), 584. <https://doi.org/10.3390/ijms20030584>
  53. Schwartz, B. G., Rezkalla S., & Kloner, R. A. (2010). Cardiovascular Effects of Cocaine. *Circulation*, 122, 2558–2569.
  54. Davies, O., Ajayeoba, O., & Kurian, D. (2014). Coronary artery spasm: An often overlooked diagnosis. *Nigerian medical journal: journal of the Nigeria Medical Association*, 55(4), 356–358. <https://doi.org/10.4103/0300-1652.137231>
  55. Talarico, G. P., Crosta, M. L., Giannico, M. B., Summaria, F., Calò, L., & Patrizi, R. (2017). Cocaine and coronary artery diseases: a systematic review of the literature. *Journal of cardiovascular medicine (Hagerstown, Md.)*, 18(5), 291–294. <https://doi.org/10.2459/JCM.0000000000000511>
  56. Wilbert-Lampen, U., Seliger, C., Zilker, T., & Arendt, R.M. (1998). Cocaine increases the endothelial release of immunoreactive endothelin and its concentrations in human plasma and urine: Reversal by coinubation with sigma-receptor antagonists. *Circulation*, 98, 385–390.
  57. Togna, G. I., Graziani, M., Russo, P., & Caprino, L. (2001). Cocaine toxic effect on endothelium-dependent vasorelaxation: an in vitro study on rabbit aorta. *Toxicology letters*, 123(1), 43–50. [https://doi.org/10.1016/s0378-4274\(01\)00379-4](https://doi.org/10.1016/s0378-4274(01)00379-4)
  58. Mo, W., Singh, A. K., Arruda, J. A., & Dunea, G. (1998). Role of nitric oxide in cocaine-induced acute hypertension. *American journal of hypertension*, 11(6 Pt 1), 708–714. [https://doi.org/10.1016/s0895-7061\(98\)00041-7](https://doi.org/10.1016/s0895-7061(98)00041-7)
  59. Perreault, C. L., Morgan, K. G., & Morgan, J. P. (1991). Effects of cocaine on intracellular calcium handling in cardiac and vascular smooth muscle. *NIDA research monograph*, 108, 139–153.
  60. Scholz A. (2002). Mechanisms of (local) anaesthetics on voltage-gated sodium and other ion channels. *British journal of anaesthesia*, 89(1), 52–61. <https://doi.org/10.1093/bja/aef163>

61. Siegel, A. J., Sholar, M. B., Mendelson, J. H., Lukas, S. E., Kaufman, M. J., Renshaw, P. F., McDonald, J. C., Lewandrowski, K. B., Apple, F. S., Stec, J. J., Lipinska, I., Tofler, G. H., & Ridker, P. M. (1999). Cocaine-induced erythrocytosis and increase in von Willebrand factor: evidence for drug-related blood doping and prothrombotic effects. *Archives of internal medicine*, 159(16), 1925–1929. <https://doi.org/10.1001/archinte.159.16.1925>
62. Goldstein, R. A., DesLauriers, C., Burda, A., & Johnson-Arbor, K. (2009). Cocaine: history, social implications, and toxicity: a review. *Seminars in diagnostic pathology*, 26(1), 10–17. <https://doi.org/10.1053/j.semmp.2008.12.001>
63. O'Leary M. E. (2002). Inhibition of HERG potassium channels by cocaethylene: a metabolite of cocaine and ethanol. *Cardiovascular research*, 53(1), 59–67. [https://doi.org/10.1016/s0008-6363\(01\)00458-8](https://doi.org/10.1016/s0008-6363(01)00458-8)
64. Ferreira, S., Crumb, W. J., Jr, Carlton, C. G., & Clarkson, C. W. (2001). Effects of cocaine and its major metabolites on the HERG-encoded potassium channel. *The Journal of pharmacology and experimental therapeutics*, 299(1), 220–226.
65. O'Leary, M. E., & Hancox, J. C. (2010). Role of voltage-gated sodium, potassium and calcium channels in the development of cocaine-associated cardiac arrhythmias. *British journal of clinical pharmacology*, 69(5), 427–442. <https://doi.org/10.1111/j.1365-2125.2010.03629.x>
66. Crandall, C. G., Vongpatanasin, W., & Victor, R. G. (2002). Mechanism of cocaine-induced hyperthermia in humans. *Annals of internal medicine*, 136(11), 785–791. <https://doi.org/10.7326/0003-4819-136-11-200206040-00006>
67. Hoffman R. S. (2010). Treatment of patients with cocaine-induced arrhythmias: bringing the bench to the bedside. *British journal of clinical pharmacology*, 69(5), 448–457. <https://doi.org/10.1111/j.1365-2125.2010.03632.x>
68. Mouhaffel, A. H., Madu, E. C., Satmary, W. A., & Fraker, T. D., Jr (1995). Cardiovascular complications of cocaine. *Chest*, 107(5), 1426–1434. <https://doi.org/10.1378/chest.107.5.1426>
69. Sandoval, Y., Smith, S. W., Thordsen, S. E., & Apple, F. S. (2014). Supply/demand type 2 myocardial infarction: should we be paying more attention?. *Journal of the American College of Cardiology*, 63(20), 2079–2087. <https://doi.org/10.1016/j.jacc.2014.02.541>
70. Pradhan, L., Mondal, D., Chandra, S., Ali, M., & Agrawal, K. C. (2008). Molecular analysis of cocaine-induced endothelial dysfunction: role of endothelin-1 and nitric oxide. *Cardiovascular toxicology*, 8(4), 161–171. <https://doi.org/10.1007/s12012-008-9025-z>
71. Bohm, F., & Pernow, J. (2007). The importance of endothelin-1 for vascular dysfunction in cardiovascular disease. *Cardiovascular research*, 76(1), 8–18. <https://doi.org/10.1016/j.cardiores.2007.06.004>
72. Previtali, E., Bucciarelli, P., Passamonti, S. M., & Martinelli, I. (2011). Risk factors for venous and arterial thrombosis. *Blood transfusion = Trasfusione del sangue*, 9(2), 120–138. <https://doi.org/10.2450/2010.0066-10>
73. Badimon, L., Padró, T., & Vilahur, G. (2012). Atherosclerosis, platelets and thrombosis in acute ischaemic heart disease. *European heart journal. Acute cardiovascular care*, 1(1), 60–74. <https://doi.org/10.1177/2048872612441582>
74. Wright, N. M., Martin, M., Goff, T., Morgan, J., Elworthy, R., & Ghoneim, S. (2007). Cocaine and thrombosis: a narrative systematic review of clinical and in-vivo studies. *Substance abuse treatment, prevention, and policy*, 2, 27. <https://doi.org/10.1186/1747-597X-2-27>
75. Graziani, M., Antonilli, L., Togna, A. R., Grassi, M. C., Badiani, A., & Saso, L. (2016). Cardiovascular and Hepatic Toxicity of Cocaine: Potential Beneficial Effects of Modulators of Oxidative Stress. *Oxidative medicine and cellular longevity*, 2016, 8408479. <https://doi.org/10.1155/2016/8408479>
76. Flores, E. D., Lange, R. A., Cigarroa, R. G., & Hillis, L. D. (1990). Effect of cocaine on coronary artery dimensions in atherosclerotic coronary artery disease: enhanced vasoconstriction at si-

- tes of significant stenoses. *Journal of the American College of Cardiology*, 16(1), 74–79. [https://doi.org/10.1016/0735-1097\(90\)90459-3](https://doi.org/10.1016/0735-1097(90)90459-3)
77. Awtry, E. H., & Philippides, G. J. (2010). Alcoholic and cocaine-associated cardiomyopathies. *Progress in cardiovascular diseases*, 52(4), 289–299. <https://doi.org/10.1016/j.pcad.2009.11.004>
  78. Havakuk, O., Rezkalla, S. H., & Kloner, R. A. (2017). The Cardiovascular Effects of Cocaine. *Journal of the American College of Cardiology*, 70(1), 101–113. <https://doi.org/10.1016/j.jacc.2017.05.014>
  79. Tazelaar, H. D., Karch, S. B., Stephens, B. G., & Billingham, M. E. (1987). Cocaine and the heart. *Human pathology*, 18(2), 195–199. [https://doi.org/10.1016/s0046-8177\(87\)80338-6](https://doi.org/10.1016/s0046-8177(87)80338-6)
  80. Virmani, R., Robinowitz, M., Smialek, J. E., & Smyth, D. F. (1988). Cardiovascular effects of cocaine: an autopsy study of 40 patients. *American heart journal*, 115(5), 1068–1076. [https://doi.org/10.1016/0002-8703\(88\)90078-6](https://doi.org/10.1016/0002-8703(88)90078-6)
  81. Isner, J. M., Estes, N. A., 3rd, Thompson, P. D., Costanzo-Nordin, M. R., Subramanian, R., Miller, G., Katsas, G., Sweeney, K., & Sturmer, W. Q. (1986). Acute cardiac events temporally related to cocaine abuse. *The New England journal of medicine*, 315(23), 1438–1443. <https://doi.org/10.1056/NEJM198612043152302>
  82. Diercks, D. B., Fonarow, G. C., Kirk, J. D., Jois-Bilowich, P., Hollander, J. E., Weber, J. E., Wynne, J., Mills, R. M., Yancy, C., Peacock, W. F., 4th, & ADHERE Scientific Advisory Committee and Investigators (2008). Illicit stimulant use in a United States heart failure population presenting to the emergency department (from the Acute Decompensated Heart Failure National Registry Emergency Module). *The American journal of cardiology*, 102(9), 1216–1219. <https://doi.org/10.1016/j.amjcard.2008.06.045>
  83. Dugo, E., Barison, A., Todiere, G., Grigoratos, C., & Aquaro, G. D. (2022). Cardiac magnetic resonance in cocaine-induced myocardial damage: cocaine, heart, and magnetic resonance. *Heart failure reviews*, 27(1), 111–118. <https://doi.org/10.1007/s10741-020-09983-3>
  84. McCord, J., Jneid, H., Hollander, J. E., de Lemos, J. A., Cercek, B., Hsue, P., Gibler, W. B., Ohman, E. M., Drew, B., Philippides, G., Newby, L. K., & American Heart Association Acute Cardiac Care Committee of the Council on Clinical Cardiology (2008). Management of cocaine-associated chest pain and myocardial infarction: a scientific statement from the American Heart Association Acute Cardiac Care Committee of the Council on Clinical Cardiology. *Circulation*, 117(14), 1897–1907. <https://doi.org/10.1161/CIRCULATIONAHA.107.188950>
  85. Mann, B. K., Bhandohal, J. S., Saeed, M., & Pekler, G. (2020). Beta Blocker Therapy in Heart Failure Patients with Active Cocaine Use: A Systematic Review. *Cardiology research and practice*, 2020, 1985379. <https://doi.org/10.1155/2020/1985379>
  86. Maceira, A. M., Ripoll, C., Cosin-Sales, J., Igual, B., Gavilan, M., Salazar, J., Belloch, V., & Pennell, D. J. (2014). Long term effects of cocaine on the heart assessed by cardiovascular magnetic resonance at 3T. *Journal of cardiovascular magnetic resonance : official journal of the Society for Cardiovascular Magnetic Resonance*, 16(1), 26. <https://doi.org/10.1186/1532-429X-16-26>
  87. Hale, S. L., Alker, K. J., Rezkalla, S., Figures, G., & Kloner, R. A. (1989). Adverse effects of cocaine on cardiovascular dynamics, myocardial blood flow, and coronary artery diameter in an experimental model. *American heart journal*, 118(5 Pt 1), 927–933. [https://doi.org/10.1016/0002-8703\(89\)90226-3](https://doi.org/10.1016/0002-8703(89)90226-3)
  88. Pitts, W. R., Vongpatanasin, W., Cigarroa, J. E., Hillis, L. D., & Lange, R. A. (1998). Effects of the intracoronary infusion of cocaine on left ventricular systolic and diastolic function in humans. *Circulation*, 97(13), 1270–1273. <https://doi.org/10.1161/01.cir.97.13.1270>
  89. Restrepo, C. S., Rojas, C. A., Martinez, S., Riascos, R., Marmol-Velez, A., Carrillo, J., & Vargas, D. (2009). Cardiovascular complications of cocaine: imaging findings. *Emergency radiology*, 16(1), 11–19. <https://doi.org/10.1007/s10140-008-0762-x>
  90. Felker, G. M., Hu, W., Hare, J. M., Hruban, R. H., Baughman, K. L., & Kasper, E. K. (1999).

- The spectrum of dilated cardiomyopathy. The Johns Hopkins experience with 1,278 patients. *Medicine*, 78(4), 270–283. <https://doi.org/10.1097/00005792-199907000-00005>
91. Patrizi, R., Pasceri, V., Sciahbasi, A., Summaria, F., Rosano, G. M., & Liyo, E. (2006). Evidence of cocaine-related coronary atherosclerosis in young patients with myocardial infarction. *Journal of the American College of Cardiology*, 47(10), 2120–2122. <https://doi.org/10.1016/j.jacc.2005.12.060>
  92. Steinhauer, J. R., & Caulfield, J. B. (2001). Spontaneous coronary artery dissection associated with cocaine use: a case report and brief review. *Cardiovascular pathology: the official journal of the Society for Cardiovascular Pathology*, 10(3), 141–145. [https://doi.org/10.1016/s1054-8807\(01\)00074-6](https://doi.org/10.1016/s1054-8807(01)00074-6)
  93. Kaminen, R., Sadhu, A., & Alpert, J. S. (2002). Spontaneous coronary artery dissection: report of two cases and a 50-year review of the literature. *Cardiology in review*, 10(5), 279–284. <https://doi.org/10.1097/00045415-200209000-00004>
  94. Meghani, M., Siddique, M. N., Bhat, T., Samarneh, M., & Elsayegh, S. (2013). Internal carotid artery redundancy and dissection in a young cocaine abuser. *Vascular*, 21(4), 243–245. <https://doi.org/10.1177/1708538113478765>
  95. Huang, M., Pang, X., Letourneau, R., Boucher, W., & Theoharides, T. C. (2002). Acute stress induces cardiac mast cell activation and histamine release, effects that are increased in Apolipoprotein E knockout mice. *Cardiovascular research*, 55(1), 150–160. [https://doi.org/10.1016/s0008-6363\(02\)00336-x](https://doi.org/10.1016/s0008-6363(02)00336-x)
  96. Lindstedt, K. A., Mäyränpää, M. I., & Kovanen, P. T. (2007). Mast cells in vulnerable atherosclerotic plaques--a view to a kill. *Journal of cellular and molecular medicine*, 11(4), 739–758. <https://doi.org/10.1111/j.1582-4934.2007.00052.x>
  97. Rangel, C., Shu, R. G., Lazar, L. D., Vittinghoff, E., Hsue, P. Y., & Marcus, G. M. (2010). Beta-blockers for chest pain associated with recent cocaine use. *Archives of internal medicine*, 170(10), 874–879. <https://doi.org/10.1001/archinternmed.2010.115>
  98. Lopez, P. D., Akinlonu, A., Mene-Afejuku, T. O., Dumancas, C., Saeed, M., Cativo, E. H., Visco, F., Mushiyeve, S., & Pekler, G. (2019). Clinical outcomes of B-blocker therapy in cocaine-associated heart failure. *International journal of cardiology*, 277, 153–158. <https://doi.org/10.1016/j.ijcard.2018.08.058>
  99. Dattilo, P. B., Hailpern, S. M., Fearon, K., Sohal, D., & Nordin, C. (2008). Beta-blockers are associated with reduced risk of myocardial infarction after cocaine use. *Annals of emergency medicine*, 51(2), 117–125. <https://doi.org/10.1016/j.annemergmed.2007.04.015>
  100. United Nations Office on Drugs and Crime, (2016), *World Drug Report*. Vienna: United Nations.
  101. Döğler, R. (2016). *Metamfetamin ve MDMA (EKSTAZİ)nün idrar ve saçta kromatografik yöntemlerle tayini*. Unpublished Master thesis. The Graduate School of Health Sciences, Ege University, Izmir, Turkey.
  102. Hoffman RJ. (2008). MDMA (ecstasy) intoxication. <http://www.uptodate.com>
  103. Kevil, C. G., Goeders, N. E., Woolard, M. D., Bhuiyan, M. S., Dominic, P., Kolluru, G. K., Arnold, C. L., Traylor, J. G., & Orr, A. W. (2019). Methamphetamine Use and Cardiovascular Disease. *Arteriosclerosis, thrombosis, and vascular biology*, 39(9), 1739–1746. <https://doi.org/10.1161/ATVBAHA.119.312461>
  104. Mendelson, J., Uemura, N., Harris, D., Nath, R. P., Fernandez, E., Jacob, P., 3rd, Everhart, E. T., & Jones, R. T. (2006). Human pharmacology of the methamphetamine stereoisomers. *Clinical pharmacology and therapeutics*, 80(4), 403–420. <https://doi.org/10.1016/j.clpt.2006.06.013>
  105. Lord, K. C., Shenouda, S. K., McIlwain, E., Charalampidis, D., Lucchesi, P. A., & Varner, K. J. (2010). Oxidative stress contributes to methamphetamine-induced left ventricular dysfunction. *Cardiovascular research*, 87(1), 111–118. <https://doi.org/10.1093/cvr/cvq043>



106. Varner, K. J., Hein, N. D., Ogden, B. A., Arsenault, J. R., Carter, K. M., & Soine, W. H. (2001). Chloroephedrine: contaminant of methamphetamine synthesis with cardiovascular activity. *Drug and alcohol dependence*, 64(3), 299–307. [https://doi.org/10.1016/s0376-8716\(01\)00132-6](https://doi.org/10.1016/s0376-8716(01)00132-6)
107. Darke, S., Kaye, S., McKetin, R., & Dufrou, J. (2008). Major physical and psychological harms of methamphetamine use. *Drug and alcohol review*, 27(3), 253–262. <https://doi.org/10.1080/09595230801923702>
108. Chin, K. M., Channick, R. N., & Rubin, L. J. (2006). Is methamphetamine use associated with idiopathic pulmonary arterial hypertension?. *Chest*, 130(6), 1657–1663. <https://doi.org/10.1378/chest.130.6.1657>
109. Swallow, C. I., & Davis, G. G. (1999). Methamphetamine as a risk factor for acute aortic dissection. *Journal of forensic sciences*, 44(1), 23–26.
110. Satendra, M., de Jesus, C., Bordalo e Sá, A. L., Rosário, L., Rocha, J., Bicha Castelo, H., Correia, M. J., & Nunes Diogo, A. (2014). Reversible catecholamine-induced cardiomyopathy due to pheochromocytoma: case report. *Revista portuguesa de cardiologia: orgao oficial da Sociedade Portuguesa de Cardiologia = Portuguese journal of cardiology : an official journal of the Portuguese Society of Cardiology*, 33(3), 177.e1–177.e1776. <https://doi.org/10.1016/j.repc.2013.09.011>
111. Ferreira, V. M., Marcelino, M., Piechnik, S. K., Marini, C., Karamitsos, T. D., Ntusi, N. A. B., Francis, J. M., Robson, M. D., Arnold, J. R., Mihai, R., Thomas, J. D. J., Herincs, M., Hassan-Smith, Z. K., Greiser, A., Arlt, W., Korbonits, M., Karavitaki, N., Grossman, A. B., Wass, J. A. H., & Neubauer, S. (2016). Pheochromocytoma Is Characterized by Catecholamine-Mediated Myocarditis, Focal and Diffuse Myocardial Fibrosis, and Myocardial Dysfunction. *Journal of the American College of Cardiology*, 67(20), 2364–2374. <https://doi.org/10.1016/j.jacc.2016.03.543>
112. Islam, M. N., Jesmine, K., Kong Sn Molh, A., & Hasnan, J. (2009). Histopathological studies of cardiac lesions after long term administration of methamphetamine in high dosage--Part II. *Legal medicine (Tokyo, Japan)*, 11 Suppl 1, S147–S150. <https://doi.org/10.1016/j.legalmed.2009.02.035>
113. Yi, S. H., Ren, L., Yang, T. T., Liu, L., Wang, H., & Liu, Q. (2008). Myocardial lesions after long-term administration of methamphetamine in rats. *Chinese medical sciences journal = Chungkuo i hsueh kò hsueh tsa chih*, 23(4), 239–243. [https://doi.org/10.1016/s1001-9294\(09\)60046-8](https://doi.org/10.1016/s1001-9294(09)60046-8)
114. Yeo, K. K., Wijetunga, M., Ito, H., Efid, J. T., Tay, K., Seto, T. B., Alimineti, K., Kimata, C., & Schatz, I. J. (2007). The association of methamphetamine use and cardiomyopathy in young patients. *The American journal of medicine*, 120(2), 165–171. <https://doi.org/10.1016/j.amjmed.2006.01.024>
115. Kumai, T., Inamasu, J., Watanabe, E., Sugimoto, K., & Hirose, Y. (2016). Differences between Takotsubo cardiomyopathy and reverse Takotsubo cardiomyopathy associated with subarachnoid hemorrhage. *International journal of cardiology. Heart & vasculature*, 11, 99–103. <https://doi.org/10.1016/j.ijcha.2016.05.010>
116. Chehab, O., Ioannou, A., Sawhney, A., Rice, A., & Dubrey, S. (2017). Reverse Takotsubo Cardiomyopathy and Cardiogenic Shock Associated With Methamphetamine Consumption. *The Journal of emergency medicine*, 53(5), e81–e83. <https://doi.org/10.1016/j.jemermed.2017.06.027>
117. Haning, W., & Goebert, D. (2007). Electrocardiographic abnormalities in methamphetamine abusers. *Addiction (Abingdon, England)*, 102 Suppl 1, 70–75. <https://doi.org/10.1111/j.1360-0443.2006.01776.x>
118. Huang, M. C., Yang, S. Y., Lin, S. K., Chen, K. Y., Chen, Y. Y., Kuo, C. J., & Hung, Y. N. (2016). Risk of Cardiovascular Diseases and Stroke Events in Methamphetamine Users: A

- 10-Year Follow-Up Study. *The Journal of clinical psychiatry*, 77(10), 1396–1403. <https://doi.org/10.4088/JCP.15m09872>
119. Zheng, X. Z., Shi, Y. Y., Chen, K. Q., Qiao, X. L., & Wang, L. Y. (2019). Evaluation of regional myocardial perfusion in methamphetamine abusers using real-time myocardial contrast echocardiography. *Medical ultrasonography*, 21(1), 56–61. <https://doi.org/10.11152/mu-1679>
120. Schürer, S., Klingel, K., Sandri, M., Majunke, N., Besler, C., Kandolf, R., Lurz, P., Luck, M., Hertel, P., Schuler, G., Linke, A., & Mangner, N. (2017). Clinical Characteristics, Histopathological Features, and Clinical Outcome of Methamphetamine-Associated Cardiomyopathy. *JACC. Heart failure*, 5(6), 435–445. <https://doi.org/10.1016/j.jchf.2017.02.017>
121. Janardhanan, R., & Kannan, A. (2016). Methamphetamine cardiotoxicity: unique presentation with multiple biventricular thrombi. *The American Journal of Medicine*, 129(1), e3–e4.
122. Kollins, S. H., MacDonald, E. K., & Rush, C. R. (2001). Assessing the abuse potential of methylphenidate in nonhuman and human subjects: a review. *Pharmacology, biochemistry, and behavior*, 68(3), 611–627. [https://doi.org/10.1016/s0091-3057\(01\)00464-6](https://doi.org/10.1016/s0091-3057(01)00464-6)
123. Volkow, N. D., Fowler, J. S., Gatley, S. J., Dewey, S. L., Wang, G. J., Logan, J., Ding, Y. S., Franceschi, D., Gifford, A., Morgan, A., Pappas, N., & King, P. (1999). Comparable changes in synaptic dopamine induced by methylphenidate and by cocaine in the baboon brain. *Synapse (New York, N.Y.)*, 31(1), 59–66. [https://doi.org/10.1002/\(SICI\)1098-2396\(199901\)31:1<59::AID-SYN8>3.0.CO;2-Y](https://doi.org/10.1002/(SICI)1098-2396(199901)31:1<59::AID-SYN8>3.0.CO;2-Y)
124. Türkmenoğlu, Y. E., Esedova, C., Akpınar, M., Uysal, T., & İrdem, A. (2020). Effects of medications on ventricular repolarization in children with attention deficit hyperactivity disorder. *International clinical psychopharmacology*, 35(2), 109–112. <https://doi.org/10.1097/YIC.0000000000000288>
125. Shin, J. Y., Roughead, E. E., Park, B. J., & Pratt, N. L. (2016). Cardiovascular safety of methylphenidate among children and young people with attention-deficit/hyperactivity disorder (ADHD): nationwide self controlled case series study. *BMJ (Clinical research ed.)*, 353, i2550. <https://doi.org/10.1136/bmj.i2550>
126. Fay, T. B., & Alpert, M. A. (2019). Cardiovascular Effects of Drugs Used to Treat Attention-Deficit/Hyperactivity Disorder Part 2: Impact on Cardiovascular Events and Recommendations for Evaluation and Monitoring. *Cardiology in review*, 27(4), 173–178. <https://doi.org/10.1097/CRD.0000000000000234>
127. Masoudkabar, F., Sarrafzadegan, N., & Eisenberg, M. (2013). Effects of opium consumption on cardiometabolic diseases. *Nature Reviews Cardiology*, 10, 733–740. <https://doi.org/10.1038/nrcardio.2013.159>
128. Schiff Jr, P. L. (2002). Opium and its alkaloids. *American Journal of Pharmaceutical Education*, 66, 186–194.
129. Traynor J. (2012).  $\mu$ -Opioid receptors and regulators of G protein signaling (RGS) proteins: from a symposium on new concepts in mu-opioid pharmacology. *Drug and alcohol dependence*, 121(3), 173–180. <https://doi.org/10.1016/j.drugalcdep.2011.10.027>
130. Kalant H. (1997). Opium revisited: a brief review of its nature, composition, non-medical use and relative risks. *Addiction (Abingdon, England)*, 92(3), 267–277.
131. Asgary, S., Sarrafzadegan, N., Naderi, G. A., & Rozbehani, R. (2008). Effect of opium addiction on new and traditional cardiovascular risk factors: do duration of addiction and route of administration matter? *Lipids in health and disease*, 7, 42. <https://doi.org/10.1186/1476-511X-7-42>
132. UNODC. (2019). *World Drug Report*.
133. Amin-Esmaili, M., Rahimi-Movaghar, A., Sharifi, V., Hajebi, A., Radgoodarzi, R., Mojtabai, R., Hefazi, M., & Motevalian, A. (2016). Epidemiology of illicit drug use disorders in Iran: prevalence, correlates, comorbidity and service utilization results from the Iranian Mental Health Survey. *Addiction (Abingdon, England)*, 111(10), 1836–1847. <https://doi.org/10.1111/>

- add.13453
134. Farahani, M. A., Ghaffari, F., & Seyed Fatemi, N. (2015). Opium addiction in patients with coronary artery disease: a grounded theory study. *Medical journal of the Islamic Republic of Iran*, 29, 267.
  135. Mohammadi, A., Darabi, M., Nasry, M., Saabet-Jahromi, M. J., Malek-Pour-Afshar, R., & Sheibani, H. (2009). Effect of opium addiction on lipid profile and atherosclerosis formation in hypercholesterolemic rabbits. *Experimental and toxicologic pathology: official journal of the Gesellschaft fur Toxikologische Pathologie*, 61(2), 145–149. <https://doi.org/10.1016/j.etp.2008.08.001>
  136. Singleton, J. H., Abner, E. L., Akpunonu, P. D., & Kucharska-Newton, A. M. (2021). Association of Nonacute Opioid Use and Cardiovascular Diseases: A Scoping Review of the Literature. *Journal of the American Heart Association*, 10(13), e021260. <https://doi.org/10.1161/JAHA.121.021260>
  137. Schultz, J. E., & Gross, G. J. (2001). Opioids and cardioprotection. *Pharmacology & therapeutics*, 89(2), 123–137. [https://doi.org/10.1016/s0163-7258\(00\)00106-6](https://doi.org/10.1016/s0163-7258(00)00106-6)
  138. Nakhaee, S., Amirabadizadeh, A., Qorbani, M., Lamarine, R. J., & Mehrpour, O. (2020). Opium use and cardiovascular diseases: a systematic review and meta-analysis. *Critical reviews in toxicology*, 50(3), 201–212. <https://doi.org/10.1080/10408444.2020.1740972>
  139. Osterwalder J. J. (1995). Patients intoxicated with heroin or heroin mixtures: how long should they be monitored?. *European journal of emergency medicine: official journal of the European Society for Emergency Medicine*, 2(2), 97–101. <https://doi.org/10.1097/00063110-199506000-00009>
  140. Ghuran, A., & Nolan, J. (2000). Recreational drug misuse: issues for the cardiologist. *Heart (British Cardiac Society)*, 83(6), 627–633. <https://doi.org/10.1136/heart.83.6.627>
  141. Aghadavoudi, O., Eizadi-Mood, N., & Najarzadegan, M. R. (2015). Comparing cardiovascular factors in opium abusers and non-users candidate for coronary artery bypass graft surgery. *Advanced biomedical research*, 4, 12. <https://doi.org/10.4103/2277-9175.148294>
  142. Zagaria, M. A. E. (2018). Cardiovascular considerations with prescription opioids and chronic pain. *US Pharm*, 43, 6–9.
  143. Nakhaee, S., Ghasemi, S., Karimzadeh, K., Zamani, N., Alinejad-Mofrad, S., & Mehrpour, O. (2020). The effects of opium on the cardiovascular system: a review of side effects, uses, and potential mechanisms. *Substance abuse treatment, prevention, and policy*, 15(1), 30. <https://doi.org/10.1186/s13011-020-00272-8>
  144. Esmaeili Nadimi, A., Pour Amiri, F., Sheikh Fathollahi, M., Hassanshahi, G., Ahmadi, Z., & Sayadi, A. R. (2016). Opium addiction as an independent risk factor for coronary microvascular dysfunction: A case-control study of 250 consecutive patients with slow-flow angina. *International journal of cardiology*, 219, 301–307. <https://doi.org/10.1016/j.ijcard.2016.06.034>
  145. Masoumi, M. (2019). Opium Is an Important Risk Factor for Coronary Artery Ectasia; a Cross-Sectional Study. *Preprint (Version 1)*, <https://doi.org/10.21203/rs.2.16809/v1>
  146. Roayaei, P., Aminorroaya, A., Vasheghani-Farahani, A., Oraii, A., Sadeghian, S., Poorhosseini, H., & Masoudkabar, F. (2020). Opium and cardiovascular health: A devil or an angel?. *Indian heart journal*, 72(6), 482–490. <https://doi.org/10.1016/j.ihj.2020.10.003>
  147. Sakai, J.T., & Crowley, T.J. (2009) Inhalant-related disorders. In B. J. Sadock, V. A. Sadock, & P. Ruiz (Eds.) *Kaplan & Sadock's Comprehensive Textbook of Psychiatry, 9th edition*, pp. 1341–1353. Lippincott Williams Wilkins, Baltimore.
  148. Williams, J. F., Storck, M., American Academy of Pediatrics Committee on Substance Abuse, & American Academy of Pediatrics Committee on Native American Child Health (2007). Inhalant abuse. *Pediatrics*, 119(5), 1009–1017. <https://doi.org/10.1542/peds.2007-0470>
  149. Flanagan, R. J., Ruprah, M., Meredith, T. J., & Ramsey, J. D. (1990). An introduction

- to the clinical toxicology of volatile substances. *Drug safety*, 5(5), 359–383. <https://doi.org/10.2165/00002018-199005050-00005>
150. Ives R. (2000). Disorders relating to the use of volatile substance. In M. G. Gelder, J. J. Lopez Ibor, & N. C. Andreasen (Eds.) *New Oxford Textbook of Psychiatry*. Oxford University Press, New York.
151. Kumar, S., Grover, S., Kulhara, P., Mattoo, S. K., Basu, D., Biswas, P., & Shah, R. (2008). Inhalant abuse: A clinic-based study. *Indian journal of psychiatry*, 50(2), 117–120. <https://doi.org/10.4103/0019-5545.42399>
152. Ridenour T. A. (2005). Inhalants: not to be taken lightly anymore. *Current opinion in psychiatry*, 18(3), 243–247. <https://doi.org/10.1097/01.yco.0000165593.52811.cd>
153. Yücel, M., Takagi, M., Walterfang, M., & Lubman, D. I. (2008). Toluene misuse and long-term harms: a systematic review of the neuropsychological and neuroimaging literature. *Neuroscience and biobehavioral reviews*, 32(5), 910–926. <https://doi.org/10.1016/j.neubio-rev.2008.01.006>
154. Yücel, M., Lubman, D. I., Solowij, N., & Brewer, W. J. (2007). Understanding drug addiction: a neuropsychological perspective. *The Australian and New Zealand journal of psychiatry*, 41(12), 957–968. <https://doi.org/10.1080/00048670701689444>
155. Vural, M., & Ögöl, K. (2005). Uçucu maddelerin kalp üzerine etkileri. *Journal of Dependence*, 6(3), 142–146.
156. Flanagan, R. J., & Ives, R. J. (1994). Volatile substance abuse. *Bulletin on narcotics*, 46(2), 49–78.
157. Ridenour, T. A., Bray, B. C., & Cottler, L. B. (2007). Reliability of use, abuse, and dependence of four types of inhalants in adolescents and young adults. *Drug and alcohol dependence*, 91(1), 40–49. <https://doi.org/10.1016/j.drugalcdep.2007.05.004>
158. Wu, L. T., & Ringwalt, C. L. (2006). Inhalant use and disorders among adults in the United States. *Drug and alcohol dependence*, 85(1), 1–11. <https://doi.org/10.1016/j.drugalcdep.2006.01.017>
159. Medina-Mora, M. E., & Real, T. (2008). Epidemiology of inhalant use. *Current opinion in psychiatry*, 21(3), 247–251. <https://doi.org/10.1097/YCO.0b013e3282fc9875>
160. Wick, R., Gilbert, J. D., Felgate, P., & Byard, R. W. (2007). Inhalant deaths in South Australia: a 20-year retrospective autopsy study. *The American journal of forensic medicine and pathology*, 28(4), 319–322. <https://doi.org/10.1097/PAF.0b013e31815b48b0>
161. Wiseman, M. N., & Banim, S. (1987). “Glue sniffer’s” heart? *British medical journal (Clinical research ed.)*, 294(6574), 739. <https://doi.org/10.1136/bmj.294.6574.739>
162. Borowiak, K. S., Ciechanowski, K., & Waloszczyk, P. (1998). Psilocybin mushroom (*Psilocybe semilanceata*) intoxication with myocardial infarction. *Journal of toxicology. Clinical toxicology*, 36(1-2), 47–49. <https://doi.org/10.3109/15563659809162584>