Effects of opium inhalation on physical and biochemical parameters of stray dogs in Kabul city, Afghanistan

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Abstract
Background: Afghanistan is one of the biggest opium-producing countries in the world. There are more than a million drug addicts in the country, and most of them are living in public places. Stray dogs who live with drug addicts are at the highest risk of inhaling drugs.
Aim: The aim of this study is to evaluate changes in physical and biochemical parameters of stray dogs inhaling drugs.
Methods: A total of 12 dogs were assigned into two groups healthy and infected (stray dogs who inhale drugs) dogs. The physical and biochemical parameters of both groups were evaluated.
Results: Subjective evaluation showed clinical changes such as congestion of conjunctiva in the infected group. Biochemical examination showed a significantly higher level of glucose \( (p < 0.05) \) and total protein (TP) \( (p < 0.01) \) in the infected group compared to the healthy group. The ratio of other biochemical parameters was slightly decreased as compared to healthy dogs.
Conclusion: Drug inhalation can alter biochemical parameters like glucose and TP in dogs.
Keywords: Addicts, Biochemical parameters, Opium, Physical parameters, Stray dogs.

Introduction
Afghanistan provides the highest percentage of world opium poppy and is counted as a major producer of opium in the world (UNODC, 2019). According to the United Nations Office on Drugs and Crime (UNODC) report, about 263,000 hectares of agricultural land was under opium poppy cultivation in 2018 in different parts of Afghanistan. Most of the products were exported to other countries as raw opium or in the form of morphine/heroin; but it has consumption inside Afghanistan as well (UNODC, 2018). Addiction is counted to be one of the important issues in the world (Singer, 2008). Even though the cultivation of opium poppy is decreased in Afghanistan, but addiction rate is dramatically increased in the country. A survey; conducted by UNODC in 2005; shows that about 920,000 Afghans (3.8% of the population) are using drugs. Several socio-economic factors; such as unemployment, illiteracy, and family issues; are involved in the increasing rate of addiction (UNODC, 2005). Low price and the widespread presence of heroin and opium in the market are two main reasons for the increased addiction rate (Qadiry, 2013). Addiction causes several health problems; such as abnormalities in blood biochemical parameters (Kouroos et al 2010) and abnormalities in hematological parameters and blood pressure; in human (Najafipour and Beik, 2016). Research studies indicated consumption of opium as a risk factor for the development of several types of cancer in different organs of the human body (Shakeri et al., 2013; Razmpa et al., 2014; Bakhshae et al., 2017; Pourmarghi et al., 2019). In Afghanistan, especially in Kabul city, thousands of stray dogs are living in close contact with drug addicts in public places (such as public parks, streets, roadsides, riversides, bus stops etc...) and inhaling the smoke of drugs used by drug addicts (Neff and Faizi, 2021). However, there are few researches on the effects of drugs in animals (Mami et al., 2011). In this study, we examined different physical and biochemical parameters of stray dogs who are living in close contact with drug addicts and inhaling smoke of opium.

Materials and Methods
Animals
A total of 12 dogs were used in this study. Dogs were randomly selected and divided into two groups of healthy and infected (stray dogs who inhale drug smoke from drug-addicted people). One dog was excluded from the group due to severe abnormalities in the hind limb. The healthy group included 4 healthy dogs (those who are living at home and receive good care), and the infected group included 7 stray dogs (those who are living in close contact with drug addicts). The dogs were weighed between 15 and 22 kg and aged between
10 to 60 months old. The age of dogs was determined by evaluating their teeth.

**Methods**

Healthy dogs were chosen from different places and stray dogs were randomly selected from places where they lived in close contact with addicts (Fig. 1). Complete physical examination; such as measurement of body temperature, pulse, respiration rate, body condition score (BCS), the color of mucus membranes, and general appearance; of every dog was performed at the beginning of the study.

Blood samples were taken from the cephalic vein under physical restraint. Blood serum was separated soon after blood collection, using centrifuge (KOKUSAN H-103N, Tokyo, Japan) for 5 minutes at 3,000 rpm. Biochemical tests for several biochemical parameters such as glucose, alkaline phosphatase (ALP), alanine aminotransferase (ALT), aspartate aminotransferase (AST), blood urea nitrogen (BUN), creatinine, triglyceride, cholesterol, and total protein (TP) were performed using biochemical analyzer (IDEXX Vet Test 8008 chemistry analyzer).

**Statistical analysis**

All data were statistically analyzed using GraphPad Prism (Version 5.00, GraphPad Software, San Diego, CA) and presented as mean ± SD. T-test was used for group comparison. A *p* value of less than 0.05 was considered to be statistically significant.

**Ethical approval**

This study was approved by the research and ethical committee of the Veterinary Science Faculty, Kabul University.

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**Fig. 1.** A stray dog living in close contact with drug addicts at riverside in Kabul city.
vice adversely (Brase et al., 1990; Azod et al., 2008). Morphine is a derivative of opium which has effects on glucose (Terner et al., 2003) and increase ratio and activity of some hormones; like adrenalin, noradrenalin and glucagon (Bossone and Hannon, 1991; Molina et al., 1994). These hormones are well known for its regulatory effects, especially rising of glucose (Karam et al., 2008). The ratio of TP has also been increased significantly \((p < 0.01)\) in infected dogs as compared to healthy dogs. Karam et al. (2008), reported that consumption of opium can increase severity of diseases. Moreover, they demonstrated effects of opium addiction on some biochemical parameters of rats, however, their findings did not indicate any changes in the protein ratio of opium addicted rats (Karam et al., 2008).

Our findings show that continuous contact of stray dogs with drug addicts can significantly affect blood glucose and protein level of stray dogs. Meanwhile ALP was significantly decreased in addict groups (Table 2). The ratios of ALT, AST, BUN, and creatinine were slightly decreased (Table 2) in stray dogs as compared to healthy dogs, however, the value was not significant.

### Conclusion

The inhalation of opium smoke alters some physical and biochemical parameters of stray dogs living in close contact with drug addicts. Further studies are required to examine more biochemical and hematological parameters in larger population of stray dogs living in close contact with drug addicts.

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### Conflict of interest

The authors declare that there is no conflict of interest.

### Authors' contribution

MMT Designed and supervised the experiment and wrote the first draft of the manuscript. SAJ and MK Collected data and conducted the experiment. MBD helps in concept of study. AH and JZ Agree with the manuscript conclusions, jointly developed the structure and arguments for the paper, made critical revision and approved final version. MMT, AH and JZ Reviewed and approved the final manuscript.

### References

Azod, L., Rashidi, M., Afkhami, M., Ardekani, G., Kiani, and Khoshkam, F. 2008. Effect of opium addiction on diabetes. American J. Drug Alcohol Abuse. 34, 383–388.

Bakhshaee, M., Raziee, H.R., Afshari, R., Amali, A., Roopoosh, M. and Lotfizadeh, A. 2017. Opium addiction and risk of laryngeal and esophageal carcinoma. Iran J. Otorhinolaryngol. 29, 19–22.

Bossone, C.A. and Hannon, J.P. 1991. Metabolic actions of morphine in conscious chronically instrumented pigs. Am. J. Physiol. 260: 1051–1057.

Brase, D.A., Singha, A.K., Estrada, U., Lux, F. and Dewey, W.L. 1990. Hypoglycemia induced by intrathecal opioids in mice: stereospecificity, drug specificity and effect of fasting. J. Pharmacol. Exp. Therap. 253, 899–904.

Jetton, J.A, Ding, K., Kim, Y. and Sone, D.U. 2014. Effects of tobacco smoking on human corneal wound healing. Cornea 33, 453–456.

Karam, G.A., Rashidinejad, H.R., Aghae, M.M., Ahmadi, J., Rahmani, M.R., Mahmoodi, M., Azin,
H., Mirzaee, M.R. and Khaksari, M. 2008. Opium can differently alter blood glucose, sodium and potassium in male and female rats. Pak. J. Pharm. Sci. 21(2), 180–184.

Kouroos, D., Tahereh, H., Mohammadreza, A. and Minoo, M.Z. 2010. Opium and Heroin Alter Biochemical Parameters of Human’s Serum. Am. J. Drug Alcohol Abuse 36, 135–139.

Mami, S., Eghbali, M., Cheraghi, J., Mami, F., Borujeni, M.P. and Salati, A.P. 2011. Effect of Opium Addiction on Some Serum Parameters in Rabbit. Global Vet. 7, 310–314.

Molina, P.E., Hashinguchi, Y., Ajmal, M., Maza, M. and Abumrad, N.N 1994. Differential homodynamic, metabolic and hormonal effects of morphine and morphine-6-glucoronide. Brain Res. 664, 126–132.

Najafipour, H. and Beik, A. 2016. The Impact of Opium Consumption on Blood Glucose, Serum Lipids and Blood Pressure, and Related Mechanisms. Front. Physiol. 7, 436.

Neff, T.G. and Faizi, F. 2021. In Kabul’s Streets, Dogs Rule the Night. New York Times. Available via https://www.nytimes.com/2021/03/21/world/asia/kabul-dogs-crime.html (Accessed 12 October 2021).

Pournaghi, S.J., Hojjat, S.K., Barazandeh Noveyri, F., Ghouchani, H.T., Ahmadi, A., Hamedi, A., Rahimi, J., Mohamaddoost, H. and Lashkardoost, H. 2019. Tobacco consumption, opium use, alcohol drinking and the risk of esophageal cancer in North Khorasan, Iran. J. Subst. Use. 24, 105–109.

Qadiry, T. 2013. Afghanistan, the drug addiction capital. BBC news. Retrieved from: https://www.bbc.com/news/magazine-22091005 (Accessed 21 December 2021).

Radosevich, P.M., Williams, P.E., Lacy, D.B., McRae, J.R., Steiner, K.E., Cherrington, A.D., Lacy, W.W. and Abumrad, N.N.1984. Effects of morphine on glucosehomeostasis in the conscious dog. J. Clin. Invest. 74, 1473–1480.

Razmpa, E., Saedi, B., Motiee-langroudi, M., Garajei, A., Hoseinpor, S. and Motamedi, M.H. 2014. Opium usage as an etiologic factor of oral cavity cancer. J. Craniofac. Surg. 25, 505–507.

Sadeghian, S., Brumand, M.A. and Sotoudeh, A.M. 2009. Effect of opium on glucose metabolism and lipid profile in rat with streptozotocin induced diabetes. Polish J. Endocrinol. 60, 258–262.

Shakeri, R., Malekzadeh, R., Etemadi, A., Nasrollahzadeh, D., Aghcheli, K., Sotoudeh, M., Islami, F., Pourshams, A., Pawlita, M., Boffetta, P., Dawsey, S.M., Abnet, C.C. and Kamangar, F. 2013. Opium: an emerging risk factor for gastric adenocarcinoma. Int. J. Cancer 133, 455–461.

Singer, M. 2008. Drugs and development: the global impact of drug use and trafficking on social and economic development. Int. J. Drug Policy 19, 467–478.

Terner, J.M., Lomas, L.M., Smith, E.S., Barrett, A.C. and Picker, M.J. 2003. Pharmacogenetic analysis of sex differences in opioid antinociception in rats. Pain 106, 381–391.

UNODC (United Nation Office on Drug and Crime). 2019. Afghanistan opium survey 2019. Socio-economic survey report: drivers, causes and consequences of opium poppy cultivation. Kabul, Afghanistan: UNODC.

Wang, S., Zhao, H., Huang, C., Li, Z., Li, W., Zhang, X. and Liu, Z. 2016. Impact of chronic smoking on meibomian gland dysfunction. PLoS One.11, e0168763.

Yoon, K.C., Song, B.Y. and Seo, M.S. 2005. Effects of smoking on tear film and ocular surface. Korean J. Ophthalmol. 19, 18–22.