

Submitted: 21/02/2022

Accepted: 13/06/2022

Published: 07/07/2022

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 (Kouros *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; Pournaghi *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

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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 \pm 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.

Results and Discussion

In this study, physical and biochemical parameters of healthy and infected (stray dogs living in close contact with addicts) dogs were examined.

Physical examination

Healthy dogs did not show any abnormal clinical signs during physical examination. All physical parameters, including body temperature, pulse rate, respiration rate, and rhythm, observation of mucus membrane, and BCS, were normal in healthy dogs. In contrast; body temperature, pulse rate, and respiration rate were decreased in infected dogs but the changes were not statistically significant (Table 1). Infected dogs were depressed and the mucus membrane of their eyes were red compared to healthy dogs. Redness of mucus membrane of the eye could be due to continuous exposure of the eyes to the smoke of opium. Studies have shown that eyes exposure to smoke can cause redness, irritation, inflammation, dry eyes and delayed wound healing of corneal defects (Jetton *et al.*, 2014). These signs could be result of mucus membrane exposure to chemical substances present in the smoke that cause chemical toxicity and oxidative damage (Yoon *et al.*, 2005; Wang *et al.*, 2016).

Biochemical examination

Biochemical examination showed significantly higher ($p < 0.05$) ratio of blood glucose in infected dogs compared to healthy dogs (Table 2). Our findings are in concordance with the previous studies on the adverse effects of opium on rats (Radosevich *et al.*, 1984; Karam *et al.*, 2008; Sadeghian *et al.*, 2009). In contrast, some other reports demonstrate the ratio of glucose



Fig. 1. A stray dog living in close contact with drug addicts at riverside in Kabul city.

Table 1. Effect of opium inhalation on physical parameters of dogs living close to addicts.

Physical parameters	Healthy dogs (mean ± SD)	Infected dogs (Mean ± SD)
Temperature (Celsius)	38.9 0 ± 0.4	38.6 ± 0.8
Pulse (beat per minute)	101.5 ± 13	96.57 ± 14
Respiration (breath per minute)	31.00 ± 9.5	27.00 ± 7.1

Table 2. Effect of opium inhalation on biochemical parameters of dogs living close to addicts.

Biochemical parameters	Healthy dogs (mean ± SD)	Infected dogs (Mean ± SD)
Glucose (mg/dl)	75.25 ± 13.50	101.3 ± 23.00*
Total protein (g/dl)	3.825 ± 0.45	5.000 ± 0.60**
Blood urea nitrogen (mg/dl)	16.50 ± 3.67	14.00 ± 4.34
Creatinine (mg/dl)	0.900 ± 0.67	0.875 ± 0.29
Alkaline phosphatase (U/l)	144.00 ± 51.43	52.86 ± 17.76**
Alanine aminotransferase (U/l)	51.67 ± 30.01	37.86 ± 24.64
Triglyceride (mg/dl)	110.08 ± 37.08	104.10 ± 9.95
Cholesterol (mg/dl)	182.50 ± 35.18	180.50 ± 33.82
Aspartate aminotransferase (U/l)	37.00 ± 18.20	27.06 ± 8.37

(*, **): Indicate significant differences of values within individual columns at $p < 0.05$ and $p < 0.01$, respectively.

vice aversely (Brase *et al.*, 1990; Azod *et al.*, 2008). Morphine is a derivative of opium which has effects on glucose (Turner *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.

Acknowledgements

The authors are grateful to Nawzad Pet Hospital staff for their contribution in performing of the experiment.

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.

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