NATURAL NARCOTICS: PHYTOCHEMICAL CONTENT ANALYSIS AND THEIR SOCIAL HAZARDS

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Abstract

Narcotics can cause a wide range of adverse effects. The analysis of the narcotics phytochemical content utilizing rapid and efficient techniques have become of imminent need. The use of illegal drugs has been a long-standing problem in the world, a problem that has taken on a particular urgency in the last 30 years. The aim of the study is to develop comprehensive rapid technique in the field of phytochemical content analysis of narcotics, and to illustrate the role of the new narcotics on many psychological, physiological and social hazards, and giving recommendations on how to find solutions to these problems. Premature mortality, epidemiologic consequences, and economic costs of illness are all presently associated with alcohol or tobacco separately greatly outweighs the comparable measures for cocaine, heroin, and all other drugs combined. Concerns about criminal enterprises and fear of an insecure future are also considered from the psychological and social hazards of the new narcotics. The availability, unemployment, and illiteracy about the hazards of these narcotics; all contribute to self-poisoning and to the cost of the health services. Therefore, it is recommended to educate young people, and to make stricter border surveillance with longer prison sentences, and increased government spending on prevention, and enforcing anti-drug laws with more research about this important topic. In conclusion, RP-HPLC alone or in combination with GC-MS has shown to be a comparatively rapid and efficient method in detection of the phytochemical content of narcotics.

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ABSTRACT

Narcotics can cause a wide range of adverse effects. The analysis of the narcotics phytochemical content utilizing rapid and efficient techniques have become of imminent need. The use of illegal drugs has been a long-standing problem in the world, a problem that has taken on a particular urgency in the last 30 years. The aim of the study is to develop comprehensive rapid technique in the field of phytochemical content analysis of narcotics, and to illustrate the role of the new narcotics on many psychological, physiological and social hazards, and giving recommendations on how to find solutions to these problems. Premature mortality, epidemiologic consequences, and economic costs of illness are all presently associated with alcohol or tobacco separately greatly outweighs the comparable measures for cocaine, heroin, and all other drugs combined. Concerns about criminal enterprises and fear of an insecure future are also considered from the psychological and social hazards of the new narcotics. The availability, unemployment, and illiteracy about the hazards of these narcotics; all contribute to self-poisoning and to the cost of the health services. Therefore, it is recommended to educate young people, and to make stricter border surveillance with longer prison sentences, and increased government spending on prevention, and enforcing anti-drug laws with more research about this important topic. In conclusion, RP-HPLC alone or in combination with GC-MS has shown to be a comparatively rapid and efficient method in detection of the phytochemical content of narcotics.

KEYWORDS
Natural Narcotics; Phytochemical Content; Analysis; Social Hazards.

1. INTRODUCTION

Traditionally, narcotics characterize a group of natural opium related compounds. Opium latex from Papaver somniferum was utilized to produce analgesia, euphoria, and induce sleep, and was used in ancient prescriptions as anti-diarrhea (Deventer, Pozo, Van Eenoo, & Delbeke, 2007).

Currently, narcotics comprise some semi-synthetic/synthetic compounds with structures related or unrelated to opium alkaloids, including fentanyl and pethidine. Narcotics are highly addictive compounds and known to make psychological and physical dependence. Narcotics are abused by some athletes to rapidly relieve pain while injured, which might affect their performance in the long run. Rapid and efficient narcotics analysis methods should be developed to limit narcotics abusive behaviors (Birchard, 2000; Bowers, Clark, & Shackleton, 2009; Wynne, Vine, & Amiet, 2004).

Therefore, the aim of the study is to develop comprehensive rapid technique in the field of phytochemical content analysis of narcotics, and to illustrate the role of the new narcotics on many

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psychological, physiological and social hazards, and giving recommendations on how to find solutions to these problems.

2. EXPERIMENTAL

Reagents, solvents, and standards

All reagents and standards have been commercially purchased (Sigma-Aldrich, Germany). All solvents were of analytical grade and were used without further purification(Saleh, El-Darra, Raafat, & El Ghazzawi, 2018).

Sample treatment

Nalorphine 1 mg/mL was added to urine to serve as an internal standard. Phosphate buffer (pH = 7.0, 0.1 M) and beta-glucuronidase were then added to the mixture, then incubated at 42° C overnight, cooled, and ammonium buffer (pH = 9.5) was added. After shaking with an organic solvent for 10 min and centrifugation(K. Raafat et al., 2018), the organic layer has been dried and the residue was dissolved MeOH/H2O/Formic acid (2:98:0.1 v/v/v)(Karim Raafat, 2018).
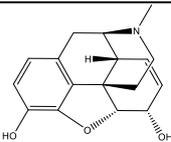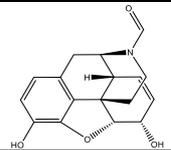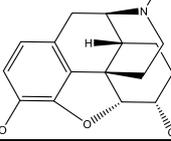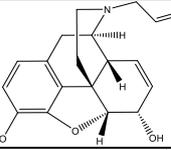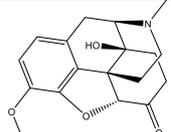
Chromatography
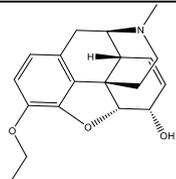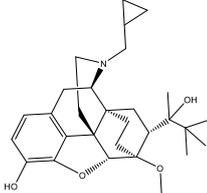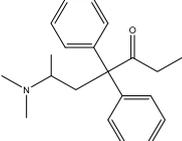
RP-HPLC Method

The RP-HPLC system (Jasco, Japan) (K. Raafat, Wurglics, & Schubert-Zsilavecz, 2016) comprised a pump and a C18 column maintained at 35°C was used for chromatographic separations. The eluent consisted of MeOH/H2O/Formic acid (10:90:0.1 v/v/v) for the first minute and the water content was decreased to 10% with a ramp of 1.5 min at flow rate 0.5 mL/min and 254 nm for 4 min.

GC-MS Method

GC equipment (Agilent, USA) with an MSD-detector supplied with Wiley library (England) and NIST library (NIST, USA)(K. M. Raafat & Omar, 2016). The tested urine was separated by HP-5 MS capillary-column. Helium was the carrier gas at 1 mL/min flow rate. The transfer line was heated at 260 °C. The operating temperature of the column was 70°C and hold for 1 min, then heat at 25°C/min to 280°C, and then a ramp of 2°C/min was applied to 290°C. The injection temperature was set to 170°C in a splitless manner. Identification of compounds was based on comparing the analyte mass spectrum with the one in the standards library.

Table 1. Chemical structures of some selected narcotics under investigation

Narcotic	Chemical Structure
Morphine	
Oxymorphine	
Hydromorphine	
Nalorphine	
Oxycodone	

Ethylmorphine	
Buprenorphine	
Methadone	

3. RESULTS AND DISCUSSION

Chromatography

RP-HPLC Method

Owing to natural opiates and their semi-synthetic/synthetic derivatives conjugated system, which facilitates their chromatographic and analytical identification (Table. 1). Utilizing the optimized RP-HPLC conditions used in this study, all compounds under investigation were eluted within a short-time range as sharp-peaks: (I) Morphine, (II) Oxymorphine, (III) Hydromorphine, (IV) Nalorphine, (V) Oxycodone, (VI) Ethylmorphine, (VII) Buprenorphine, and (VIII) Methadone (Fig. 1). Nalorphine, the internal-standard, was well eluted (as peak IV) with RT of 1.75 min, which is in the mid-range of the chromatogram. This method has shown to be a rapid and efficient method in separation and identification of various narcotics in biological fluids.

GC-MS Method

The amine function group in the narcotics can facilitate their MS-ESI protonation during the GC-MS separation and identification. GC-MS analysis of some selected narcotics has shown that ca. 97% of peaks are narcotics that include; Morphine (6.23%), Oxymorphine, (7.05%), Hydromorphine (11.70%), Nalorphine (12.72%), Oxycodone (12.04%) Ethylmorphine (7.47%), Buprenorphine (20.83%), and Methadone (19.34%) (Fig. 2). This method has shown to be also an efficient method in identification and separation of a variety of narcotics in biological fluids.
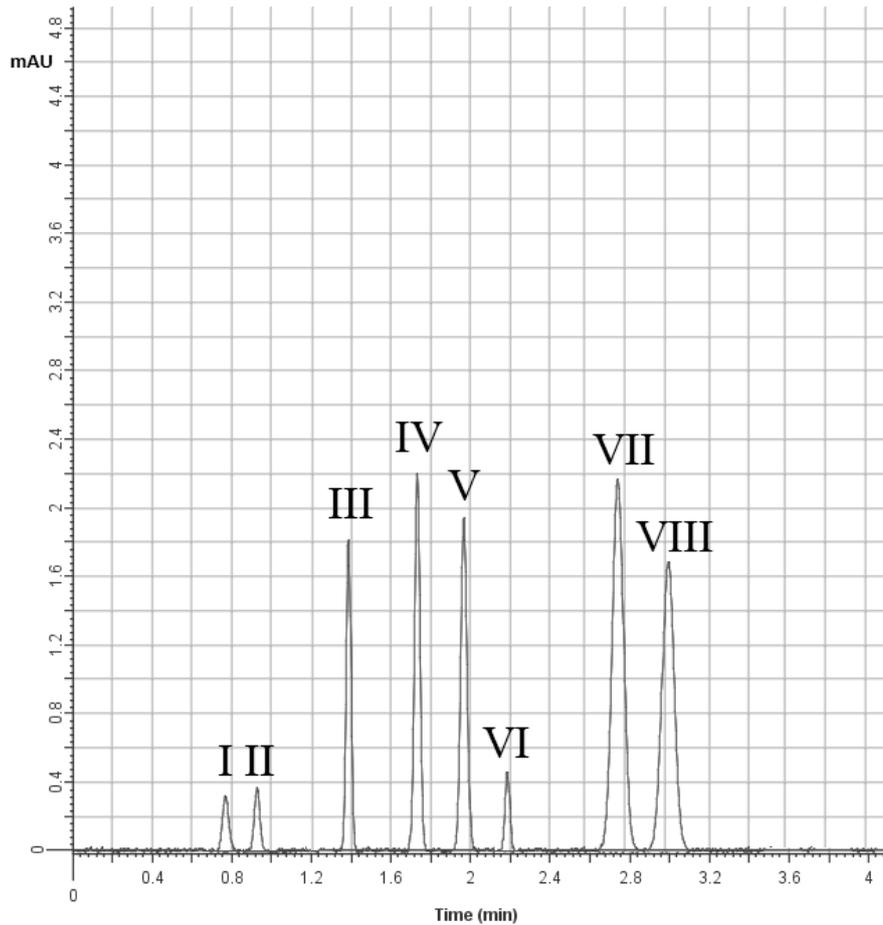
Fig. 1. The RP-HPLC Chromatogram for identification of some selected narcotics: (I) Morphine, (II) Oxymorphine, (III) Hydromorphine, (IV) Nalorphine, (V) Oxycodone, (VI) Ethylmorphine, (VII) Buprenorphine, and (VIII) Methadone.
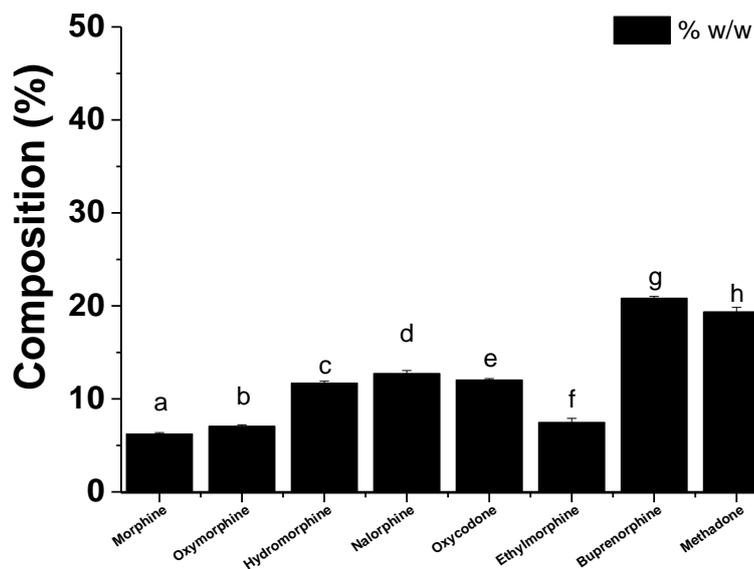

Fig. 2. The GC-MS composition of some selected narcotics. Values are means of triplicate determinations ± S.E.M. Values with different letters are significantly different ($p \leq 0.05$).

Table 2. Comparison between narcotics under investigation actual weights and RP-HPLC and GC-MS measured weights

	Actual weight (W/W)	**RP-HPLC** (W/W)	**GC-MS** (W/W)
Morphine	6.50	5.94	6.23
Oxymorphine	7.00	6.73	7.05
Hydromorphine	12.00	11.17	11.70
Nalorphine	13.00	12.14	12.72
Oxycodone	12.50	11.48	12.04
Ethylmorphine	7.50	7.12	7.47
Buprenorphine	21.50	19.88	20.83
Methadone	20.00	18.45	19.34
Total	100%	92.92%	97.38%

Narcotics Social Hazards and Recommendations

Premature mortality, epidemiologic consequences, and economic costs of illness are all presently associated with alcohol or tobacco separately greatly outweighs the comparable measures for cocaine, heroin, and all other drugs combined. Concerns about criminal enterprises and fear of an insecure future are also considered from the psychological and social hazards of the new narcotics. The availability, unemployment, and illiteracy about the hazards of these narcotics; all contribute to self-poisoning and to the cost of the health services (Kampman & Jarvis, 2015). Therefore, it is recommended to educate young people, and to make stricter border surveillance with longer prison sentences, and increased government spending on prevention, and enforcing anti-drug laws with more research about this important topic.

3. CONCLUSIONS

The RP-HPLC alone or in the combination of GC-MS method allows the determination of eight narcotics in urine. The RP-HPLC method has shown superiority in saving time with less than 4 min method in detection of the selected narcotics. Furthermore, the GC-MS method has shown higher precession in measuring the narcotics under investigation (Table. 2). In conclusion, RP-HPLC alone or in combination with GC-MS has shown to be a comparatively rapid and efficient method in detection of the phytochemical content of narcotics and can be efficiently used in the drug-doping analysis.

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