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Research article

MS analysis and antimicrobial activity of fixed oil from Saudi Peganum harmala L. (*Zygophyllaceae*)

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ABSTRACT

In this study the lipid composition of Saudi material of Peganum harmala (L.) seeds was identified and quantified. The antimicrobial activity of the extracted fixed oil was assessed. The following major components were detected: 9,12– octadecadienoic acid (56.08%),9- octadecenoic acid (22.35%), hexadecanoic acid methyl ester (9.24%), methyl stearate (4.56%). The fixed oil was extracted by two different methods (soxhlet and maceration). Each sample was screened for antimicrobial activity using cup plate agar diffusion assay against eight standard human pathogens. The influence of. the method of extraction on the antimicrobial activity was investigated. muscle.

Keywords: Peganum harmala, Fixed oil, GC-MS, Antimicrobial activity.

INTRODUCTION

Peganum harmala L. (Zygophyllaceae) is native to eastern Mediterranean region. Peganum harmala is a perennial plant which can grow to about 0.8 m tall. It blossoms between June and August in the northern hemisphere. The flowers are white and are about 2.5–3.8 cm in diameter. Peganum harmala is used traditionally in the treatment of a wide array of human disorders. β-Carboline alkaloids were identified in different parts(seeds,roots,barks) of Peganum harmala. Pharmacological surveys testified that harmala alkaloids namely; harmaline, harmine, harmalol and harmol are biologically active compounds.

The plant is employed in ethno-medicine to treat hypertension and cardiac disease. Extracts of seeds are said to exert vasorelaxant effects and alkaloids of Peganum harmala were shown to have anti-platelet aggregation effects. Furthermore,these alkaloids were shown to be psychoactive in mammalian body. Various studies demonstrated a wide range of effects produced by Peganum harmala extracts including analgesic, hallucination, excitation and antidepressant effects. Harmal alkaloids were shown to be involved in pathogensis of Parkinson`s disease.

Various studies indicated antiparasidal, antifungal, anti-bacterial and insecticidal effects for Harmal alkaloids. Significant antileishmanial activity was exhibited by Peganum harmala seeds extract. Also, Harmal methanolic extracts produced a dose- dependent decrease in litter size of model animals. Frequent abortion was observed in animals that feed the plant.

Recently there has been increasing interest in the use of medicinal plants in developing countries to treat a broad spectrum of human disorders. In parallel increased scientific interest in the bioconstituents (steroids,alkaloids,flavonoids.etc) of these plants was also observed. A knowledge of bio-active components would evidently site a rationale for traditional uses of medicinal plants and enrich the global database of phytochemicals. Plant constituents are usually influenced to some extent by geographical distribution. In this study the constituents and antimicrobial potential of Saudi Peganum harmala oil is addressed [1].

MATERIALS AND METHODS

Plant material

Seeds of Peganum harmala were purchased from the local market – Riyadh - Saudi Arabi. The plant was identified and authenticated by Dr. Mohammad Abhary,Biotechnology Laboratory, Faculty of Science, Taiba University [2].

Instruments

A Shimadzo GC-MS-QP2010 Ultra instrument with a RTX-5MS column (30m, length; 0.25mm diameter; 0.25 µm, thickness) was used for GC-MS analysis.

Test organisms

Peganum harmala oil was screened for antibacterial and antifungal activities using the standard microorganisms shown in Table (1) [3].

Table 1: Test organisms

Micro-organism	Type
Bacillus subtilis	G+ve
Staphylococcus aureus	G+ve
Pseudomonas aeroginosa	G-ve
Escherichia coli	G-ve
Klebsiella pneumoniae	G-ve
Acinetobacter baumannii	G-ve
Aspergillus flavus	fungi
Candida albicans	fungi

Antimicrobial assay

Preparation of bacterial and fungal suspensions

Aliquotes (1ml) of 24h broth culture of the microrganisms were incubated for 24h at 37°C after being aseptically distributed onto nutrient agar slopes. The harvested bacterial growth was washed off with sterile normal saline and suspended in normal saline(100ml) to afford about 108- 109colony forming units per ml. This suspension was stored at 40C for further manuplation.Using the surface viable counting technique, the average number of viable organism per ml of the stock suspension was determined. Serial dilutions were made and (0.02ml) of the appropriate dilutions were transferred onto the surface of dry nutrient agar plates. After 2h at room temperature, the plates were incubated at 37°C for 24 hours. Cultures of fungi were maintained on potato dextrose agar and were incubated for four days at 25°C. The harvested fungal growth was washed with sterile normal saline, and stored in the refrigerator(40C) until used.

Testing for antibacterial activity

The antibacterial activity of the test oil was assessed via cup-plate agar diffusion bioassay, with some minor modifications. The standardized bacterial stock suspension(2ml) was mixed with 200 ml of sterile nutrient agar which was maintained at 45°C in a water bath. (20ml) of incubated nutrient agar were distributed into sterile Petri dishes and was left to settle. Plates were divided into two halves. Two cups in each half (diameter, 10mm) were cut using cork borer (No 4), each of these cups was used for a test solution. Similar Petri dishes were used for standard antimicrobial chemotherapeutics.

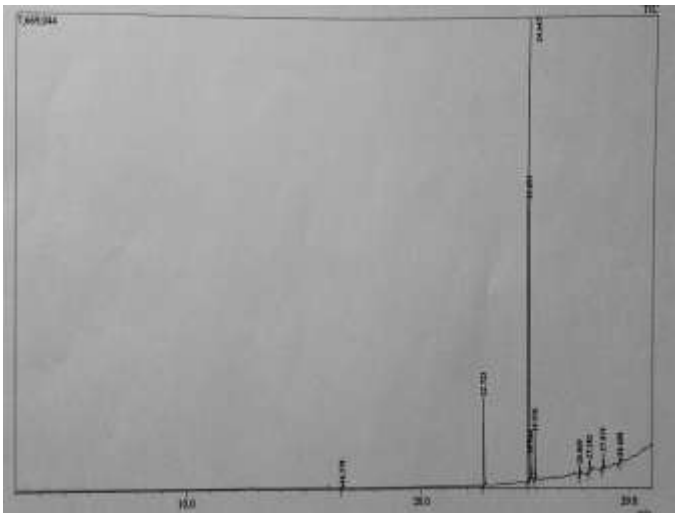
Finally, agar discs were removed and alternate cups were filled with samples (0.1 ml) and left to diffuse at room temperature for 2h. They were incubated in the upright position for 24 h. at 37°C. Following incubation, the diameters of the growth inhibition zones were measured in triplicates and averaged [4, 5].

RESULTS AND DISCUSSION

GC-MS analysis of *Peganum harmala* fixed oil

Using GC-MS analysis the constituents of *Peganum harmala* oil were identified and quantified. The observed fragmentation pattern was also interpreted. Excellent match (90-95%) with the database on MS library was observed. Ten components were revealed by GC-MS analysis (Table 2). Typical total ion chromatogram is displayed Figure 1.

Figure 1: Cromatograms of *Peganum harmala* oil



Pyramidalis acts as tensor of the linea alba. It is considered functionally less important. Pyramidalis is absent in about 20% of cases.3 Sometimes the pyramidalis is present on one side of the body but not the other. In other cases, there are two pyramidalis on one side, with the doubled muscles often being unequal in size. Many scientists believe that this muscle is left over from the days of humans being similar to marsupials containing pouches, and as such, has lost most of its function in the process of evolution. The absence of pyramidalis muscle is reported in 14.8% of subjects. It is also reported agenesis of pyramidalis muscle in 8.33% of cases6, 7, the absence signifies its minor role in tensing linea alba.

While making the longitudinal incision for a classical caesarean section the pyramidalis is used to determine midline and location of the linea alba [6].

CONCLUSION

Pyramidalis is variable and rudimentary muscle in the rectus sheath anterior to the rectus abdominis muscle. This muscle is found absent with rate of about 20%. The presence of this muscle is also variable. So, before taking the various incisions for the surgeries which are related to the anterior abdominal wall, it is necessary for the

surgeons to have the information about the variations of pyramidalis muscle.

Declaration of interest

The authors declare that there is no conflict of interest.

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