جامعة سلمان بن عبدالعزيز
Salman bin Abdulaziz University

Pharmacy Student Research Projects

College of Pharmacy
Salman bin Abdulaziz University
1435 (2014)

Editorial Committee

Dean's Message

In the midst of a rapidly growing pharmacy education, student research projects have become an important component in the curricula of many pharmacy colleges around the world. In particular, this activity works to ensure the integration of a range of sciences that the pharmacy student would have mastered during his college years and sharpened critical kills needed for the future.

We, at the College of Pharmacy of Salman bin Abdulaziz University, are proud to have developed a world-class research program for our students during their last year of the college education for a variety of pharmacy disciplines including both pharmaceutical sciences and pharmacy practice. The program starts by introducing the students to the principles of research methodologies and research ethics. This is followed by assigning various research projects to students according to pre-selected topics and availability of academic supervisors to guide and assist performance throughout the course. At the final stage, the completed projects are presented during our Pharmacy Students Research Day and the students are evaluated by a faculty member committee.

I hope that you will find abstracts given in this book interesting and reflect our pharmacy students' aptitude toward scientific research as well as our college's capacity to provide pharmacy students with a unique experience, which should add to their abilities to develop prospect careers.

Khalid M. Alkharfy
Dean and Professor
College of Pharmacy
Salman bin Abdulaziz University
Alkharj, Saudi Arabia

Department of Clinical Pharmacy

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Measuring the Rate of Therapeutic Adherence Among Patients with T2DM in Alkharj City

Waleed S. Aljuris, Khalid M. Alkharfy

College of Pharmacy, Department of Clinical Pharmacy, Salman bin Abdulaziz University

Introduction

Diabetes mellitus (DM) is one of the most common non-communicable diseases, and its epidemic proportion has placed it at the forefront of public health challenges currently facing the world. In the Middle East, there has been a rapid increase in the incidence of DM, consisting mainly of Type 2 (T2DM). Despite of the advances in understanding of the disease and its management, the morbidity and mortality rates are in rise. Non-adherence or non-compliance, poverty, lack of knowledge and poor follow ups are the main factors observed in poor glycemic control. Individuals with poor management of diabetes are at a greater risk of developing long-term micro- and macro-vascular complications, which affect the direct and indirect health care costs and overall quality of life.

The promotion of therapeutic adherence is considered as an integral component of pharmaceutical care practice and patient healthcare. Therefore, this study sought to examine the rate of medication adherence and different factors affecting it, as well as, its impact on glycemic control among T2DM patients in Alkharj City.

Methods

From April 2014 to May 2014, a total 36 T2DM patients attending the Outpatient Clinics of Salman bin Abdulaziz University Hospital in Alkharj City were recruited into the study. Patients' consent was obtained according to the regulations of the Code of Ethics of the hospital. The adherence will be assessed during a personal interview with each patient using a structured questionnaire addressing the following aspects:

1. Socio-demographic patient profile.
2. Level of knowledge about diabetes mellitus disease and its complications.
3. Patient-health care provider relationship, regularity of monitoring of blood glucose level, number of drug taken, drug regimen, and experience side effects.

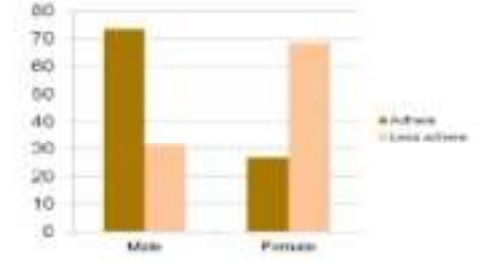
Data are presented as Mean±SD or percentages as appropriate. Analyses of variance were used for continuous variables and Chi-square test for categorical data. Analysis was carried out using SPSS version 19 (Statistical package for Social Science, Inc., Chicago IL, USA); a P value of <0.05 will be considered significant.

Subject Demographic Characteristics	
Gender	47.2%
Male	52.8%
Female	
Age (year)	16.7%
30-40	80.6%
41-60	2.8%
>60	
Nationality	75%
Saudi	25%
Non Saudi	
Marital	2.8%
Single	97.2%
Married	
Glycemic control	6.91±0.56 µmol/L
FBG	7.46±0.95%
HbA1C	

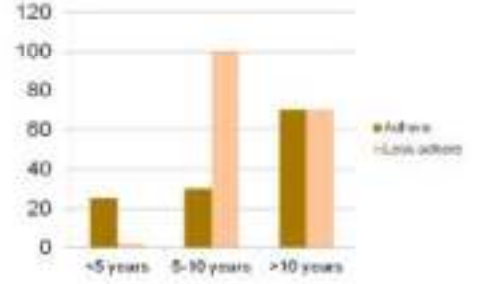
Results

Drug Therapy and Adherence	
No. of T2DM medications	
One	5.6%
Two	77.7%
Three	16.7%
Other disorders	
Hypertension	8.3%
Lipid disorders	36.1%
Hypertension & lipid disorder	22.2%
None	33.3%
Filling medication regularly	
Yes	94.4%
No	5.6%
Dose missing	
Yes	57.1%
No	28.6%
Cannot remember	14.3%
Medication counseling	
Yes	91.4%
No	8.6%
Adherence to T2DM Medications	
Adhere	44.1%
Less adhere	55.9%

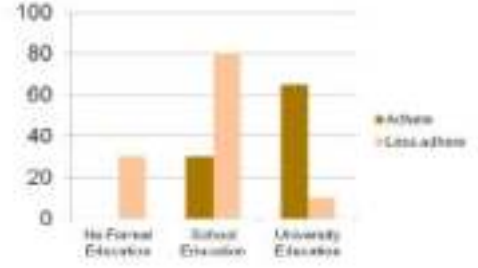
Subject gender



T2DM Duration



Education Level



Blood Sugar monitoring

Discussion

The current findings showed that many of the study subjects are on multiple medications for T2DM and co-morbid conditions such as lipid disorders. While the majority confirmed filling their T2DM medications on a regular basis, 57% admitted missing medication doses before. Further, despite receiving seemingly adequate patient counseling by their primary health care provider, about 56% of subjects are non-adherent to their drug therapy. Males were found to be more adherent than females. Also, it seems that higher education level and duration of T2DM are important factors in patient adherence. More educated people tend to appreciate and understand the consequences of non-adherence, and the longer T2DM duration can affect patient's perception about their disease conditions ($P < 0.05$). Indeed, illiterate patients cannot read or distinguish their medications, which increases the risk of errors and non-adherence. Therefore, support provided by family is expected to play a beneficial role in enhancing adherence. Our results also confirm that only a small percentage of the study population monitors blood sugar on a daily basis whereas about 92% perform it once a month.

Conclusion

In summary, the current study has demonstrated less satisfactory adherence in T2DM patients particularly in females. An improvement with medication adherence may be achieved through continuing patient education about the disease and medications, improvement of pharmacist participation in counseling and care activities, and encouraging patients to monitor their blood glucose level regularly.

Assessment of Saudi Pharmacists Knowledge regarding counseling patients About Chronopharmacology of Antihypertensive Drugs (Renin Angiotensin Aldosterone system Antagonist and Diuretics)

Saad Al-Dosari, Mohammed Al-Subaie MSc, Mohammed Abd-alaziz MD,PhD

Department of Clinical Pharmacy, College of Pharmacy, Salman bin Abdulaziz University, Al-Kharj 11942, Kingdom of Saudi Arabia

Introduction: Hypertension affects about 15.1% of Saudi population including 17.7% males and 12.5% females and these percentages growing with age, according to Saudi ministry of health statistics on 2012.[1]. The cardiovascular system is highly organized in time; blood pressure (BP), heart rate (HR), peripheral resistance, pressure and the release/activity of vasodilating hormones all display pronounced circadian variations [2]. Cardiovascular functions such as heart rate and blood pressure show 24 hour variation, so prescribing of antihypertensive medications to patients is time dependent to give maximum blood pressure control regarding chronopharmacology .

Chronopharmacology is a study of the interaction between medications effects and biological timing of different body systems events and patterns. The efficacy of antihypertensive agents was determined when given at right time according biological rhythm [3].

Problem: Most of patients are not aware and adherent to biological rhythm when taking his/her medications.

Methods: The research question: Does patient counseling provided by Saudi pharmacists have a positive impact on medication adherence to biological rhythm?

Aim and Objectives: To evaluate practice of Saudi pharmacist regarding drug time interactions.

1. To measure pharmacist's knowledge about chronopharmacology of antihypertensive medications.
2. To assess pharmacist practice when providing patient counseling for hypertensive patients.

Study design: Descriptive cross – sectional survey.

Study recruitments methods: a questionnaire prepared by researcher containing closed and open questions. Confidentiality maintained by coding questionnaires after data collection.

Data collection methods: researcher – led questionnaires.

Data analysis methods: Data analyzed using descriptive statistics using Microsoft Office Excel 2010 to provide an overview of the quantitative data collected.

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Results: We surveyed 46 community pharmacists. The majority of them, 40 pharmacists (87%) hold a bachelor degree and nearly half of them, 25 pharmacists (54%) have an experience working in the pharmacy profession ranging from 6 to 10 years.

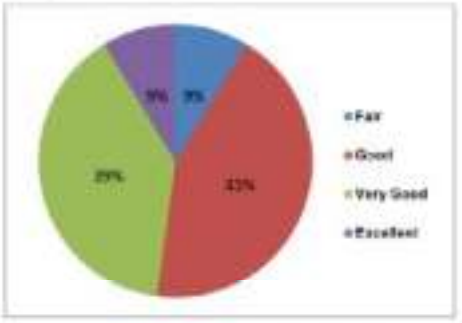

Figure 1: Saudi Pharmacists Considerations on Chronopharmacology of Antihypertensive Medications (n=46)

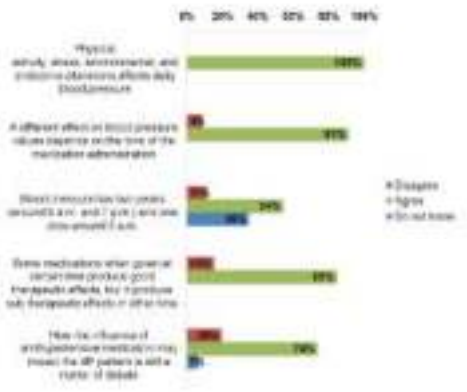

Figure 2: Awareness of Saudi Pharmacists about Biological Rhythm of Hypertension (n=46)

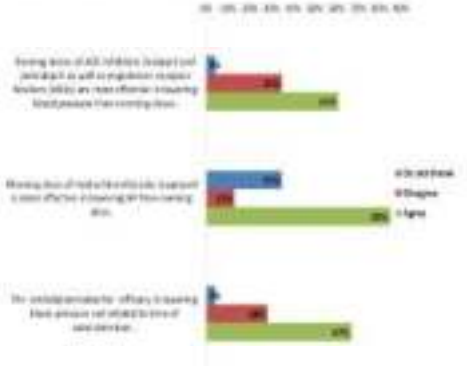

Figure 3: Awareness of Saudi Pharmacists about Chronopharmacology of Antihypertensive Medications (RAAS Antagonist and Diuretics)(n=46)

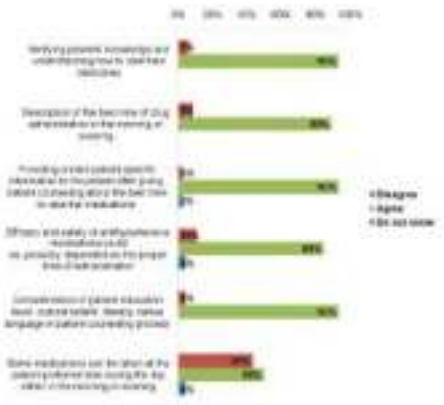

Figure 4: Contribution of Pharmacists Counselling Hypertensive Patients (n=46)

Discussion: Regarding the pharmacist's knowledge of hypertension biological rhythms, nearly half of our sample (54%) knows that blood pressure has two peaks (around 9 a.m. and 7 p.m.) and one drop around 3 a.m.

Pharmacist's knowledge regarding morning versus evening administration of antihypertensive medications shows consistent variations for majority of our survey questions. Nearly one third of our sample disagreed on evening doses for ACEIs, ARBs, and nifedipine GITS.

Although, the majority (89%) of the pharmacists agreed on description of the best time of drug administration in the morning or evening when counselling the patient, half of them (50%) agreed that patients can take their medicines at their preferred time either in the morning or evening.

Generally, pharmacists rated (82%) their overall consideration of chronopharmacology when counselling patients as good.

Conclusion: Our study indicated that the practice of pharmacists regarding the awareness of time drug interactions needs further improvement. The improvement can be done by contribution of healthcare professionals and providers to feedback about the appropriate pharmaceutical care provided regarding the importance of patient counseling and chronopharmacology.

References:

(1) Ministry of health, Health statistical year book . Saudi Arabia, 2012. print.

(2) Weber MA, Tonkon MJ, Klein RC. 1987. Effect of antihypertensive therapy on the circadian blood pressure pattern. *The American Journal of Medicine*. 5:82(1A):50-2.

(3) Vidyavati S Koppiketti, Nikhil Chandra and M Bhagvan Raju . 2010 . Vital Role of Chronopharmacology and Chronopharmacotherapy In Human Life. *International Journal of Research in Pharmaceutical and Biomedical Sciences. Available* [online] at http://www.ijrpbsonline.com/files/R02.pdf accessed on 12 May 2014.

Acknowledgement:

We would like to express our special appreciation and thanks to Dr Mostafa Maged Mohamed , Innovah company and all colleagues employed in Innovah company who co-operated for conduction of this study.

Exploring the Role of Pharmacists in Providing Diabetic Patient Counselling (T1DM)

Ibrahim Alotaibi[1], Abdullah Aljahan MSc[2], Fahad Alsalkhan PhD[3]

Department of Clinical Pharmacy, College of Pharmacy, Salman bin Abdulaziz University, Al-Kharj 11942, Kingdom of Saudi Arabia

Introduction: Diabetes is a major global public health problem with a dramatic increase. The prevalence of diabetes for all age-groups worldwide was estimated to be 2.8% in 2000 and 4.4% in 2030 and the total number of people with diabetes was projected to rise from 171 million in 2000 to 366 million in 2030 (Al-Shahrani & Hassan et al., 2012). Al-Shahrani & Hassan et al., 2012 says "In the Kingdom of Saudi Arabia; the number of people with diabetes is increasing due to population growth, aging, urbanization, and increasing prevalence of obesity and physical inactivity. The overall prevalence of diabetes was 23.7%, with 26.2% being males and 21.5% females. The calculated age-adjusted prevalence for Saudi population for the year 2000 is 21.9%. Diabetes mellitus is more prevalent among Saudis living in urban areas 25.5% compared to rural areas as 19.5%. Despite the readily available access to healthcare facilities in Saudi Arabia, 28% of diabetics were unaware of having diabetes."

Methods: The research question

Examine the role of pharmacists in providing information and education for diabetic patient.

Aim: Examine the role of pharmacists in providing information and education for diabetic patient.

Objectives:

1. To enhance the education and training level
2. To evaluate the effectiveness of the role of pharmacists in providing information and education for diabetic patient type 1.

Study design: Quantitative approach using a questionnaire.

Study recruitments methods:

A questionnaire developed by researcher consisting of closed and open questions. Polit & Beck (2010) define the validity of questionnaire as the degree to which the instrument measures what it is intended to measure. The questionnaire should adequately address all aspects of the issues being studied

Data collection methods:

A protocol consisting of written questionnaire will be used to obtain the data.

Data analysis:

Methods Data analyses will be carried out using Microsoft Excel.

Results: N=41 participants agreed to participate in this research effort and upon selecting "I agree to participate" 36.6% (N=15) worked in a professional capacity in the community pharmacy for more than one month but less than three years, 29.3% (N=12) worked

in a professional capacity in the community pharmacy between three and six years, 19.5 % (N=8) worked in a professional capacity in the community pharmacy more than 6 month but less than one year , and an additional 7.3%, (N=3) worked in a professional capacity in the community pharmacy for less than six months and same percentage worked for 6 years or more.

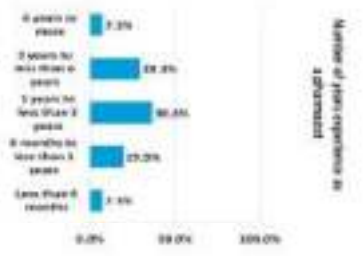

Figure 1: Number of years experience as a pharmacist (n=41)

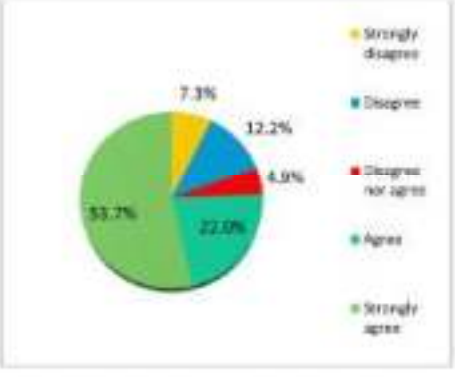

Figure2: The pharmacists should have extra training and education when they deal with diabetic patients.

When participants were asked whether or not they agreed with the statement "The pharmacists should have extra training and education when they deal with diabetic patients," the responses were mixed, however the majority were in agreement. A total of 53.7% (N=22) strongly agreed, with an additional 22% (N=9) agreeing with the statement directly. A surprising 12.2% (N=5) were disagreed with the statement, and 7.3% (N=3) strongly disagreed with the statement indicating they did not commitment to deal with diabetic patient.

Conclusions: the roles of pharmacist in providing information and education for diabetic patient (T1DM) . In excess of half of all participants also stated they believe the pharmacist spends sufficient time for providing adequate information. Participants identified their perception of the varied impacts related to time a key factor, including time to spend with patients, providing the best information to utilize insulin and prevent mistakes re-occurring.

References:

1. Al-Shahrani, A. M., Hassan, A., Al-Rubeaan, K. A., Al Sharqawi, A. H. & Ahmad, N. A. (2012). Effects of diabetes education program on metabolic control among Saudi type 2 diabetic patients.

2. Healthchecksystems.com. (2014). Diabetes: A brief introduction. [online] Retrieved from: http://www.healthchecksystems.com/diabetes.htm [Accessed: 2 Apr 2014].

3. Mokhtar, S., El Mahalli, A., Al-Mulla, S. & Al-Hussaini, R. (2012). Study of the relation between quality of inpatient care and early readmission for diabetic patients at a hospital in the Eastern province of Saudi Arabia. Eastern Mediterranean Health Journal, 18 (5).

4. Polit, D.F., Beck, C.T. (2010). Essentials of Nursing Research: Appraising Evidence for Nursing Practice. 7th ed. Philadelphia: Lippincott Williams & Wilkins.

Acknowledgement: We would like to express our special appreciation and thanks to Dr Mostafa Maged Mohamed, Innova Pharmaceutical Company and all colleagues who co-operated for conduction of this study.

Assessment of Saudi Pharmacists Knowledge regarding counseling patients About Chronopharmacology of Antihypertensive Drugs (Calcium Channel Blockers, and α & β Blockers)

Abdullah Al Hammad , Mohammed Al-Subaie MSc[1], Mohammed Abd-ulaziz MD,PhD[1]

Department of Clinical Pharmacy, College of Pharmacy, Salman bin Abdulaziz University, Al-Kharj 11942, Kingdom of Saudi Arabia

Introduction: Hypertension affects about 15.1% of Saudi population including 17.7% males and 12.5% females and these percentages growing with age, according to Saudi ministry of health statistics on 2012.[1]. The cardiovascular system is highly organized in time; blood pressure (BP), heart rate (HR), peripheral resistance, pressure and the release/activity of vasodilating hormones all display pronounced circadian variations [2]. Cardiovascular functions such as heart rate and blood pressure show 24 hour variation, so prescribing of antihypertensive medications to patients is time dependent to give maximum blood pressure control regarding chronopharmacology.

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Problem: Most of patients are not aware and adherent to biological rhythm when taking his/her medications.

Methods:

The research question: Does patient counseling provided by Saudi pharmacists have a positive impact on medication adherence to biological rhythm?

Aim: To evaluate practice of Saudi pharmacist regarding drug time interactions.

Objectives:

1. To measure pharmacists knowledge about chronopharmacology of antihypertensive medications **(Calcium Channel Blockers, α & β Blocker)**
2. To assess pharmacist practice when providing patient counseling for hypertensive patients.

Study design: Descriptive cross – sectional survey.

Study recruitments methods: a questionnaire prepared by researcher containing closed and open questions. Confidentiality maintained by coding questionnaires after data collection.

Data collection methods: researcher – led questionnaires.

Data analysis methods: Data analyzed using descriptive statistics using Microsoft Office Excel 2010 to provide an overview of the quantitative data collected.

Results: We surveyed 46 community pharmacists. The majority of them, 40 pharmacists (87%) hold a bachelor degree and nearly half of them, 25 pharmacists (54%) have an experience working in the pharmacy profession ranging from 6 to 10 years.

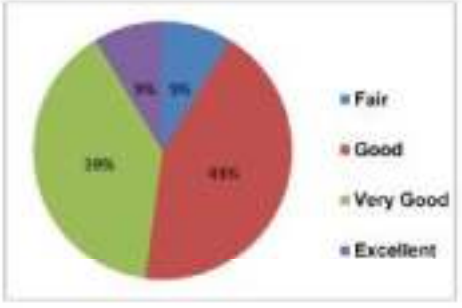

Figure1: Saudi Pharmacists Considerations on Chronopharmacology of Antihypertensive Medications (Calcium Channel Blockers, α & β Blocker) (n=46)

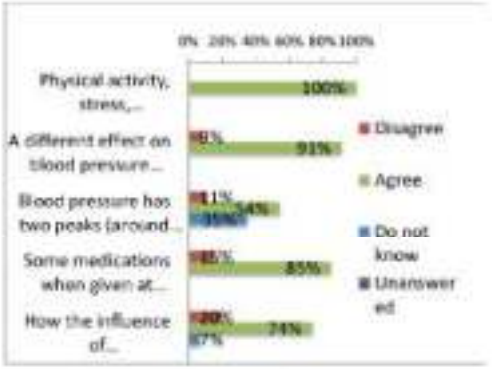

Figure2: Awareness of Saudi Pharmacists about Biological Rhythm of Hypertension (n=46)

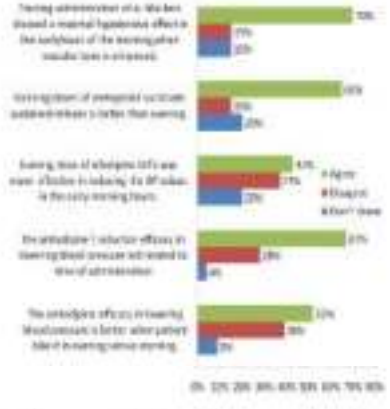

Figure3: Awareness of Saudi Pharmacists about Chronopharmacology of Antihypertensive Medications (Calcium Channel Blockers, α & β Blocker) (n=46)

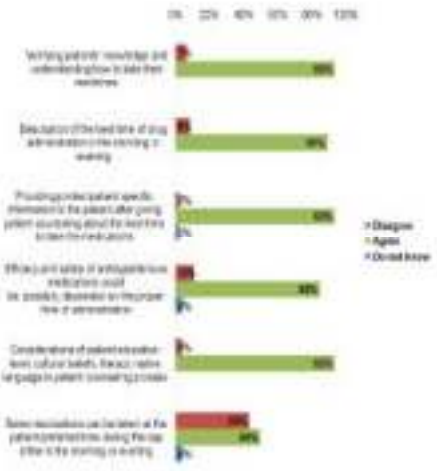

Figure 4: Contribution of Pharmacists Counselling Hypertensive Patients (n=46)

Discussion: Regarding the pharmacist's knowledge of hypertension biological rhythms, nearly half of our sample (54%) knows that blood pressure has two peaks (around 9 a.m. and 7 p.m.) and one drop around 3 a.m.

Pharmacist's knowledge regarding morning versus evening administration of antihypertensive medications shows consistent variations for majority of our survey questions. Nearly one third of our sample disagreed on evening doses for **ACEIs, ARBs, and nifedipine GITS**.

Although, the majority (89%) of the pharmacists agreed on description of the best time of drug administration in the morning or evening when counselling the patient, half of them (50%) agreed that patients can take their medicines at their preferred time either in the morning or evening.

Generally, pharmacists rated (82%) their overall consideration of chronopharmacology when counselling patients as good.

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Exploring the Role of Pharmacists in Providing Diabetic Patient Counselling *(T2DM)*

Abdullah Hazazi[1], Abdullah Aljahan MSc[2], Fahad Alsaikhan PhD[3]

Department of Clinical Pharmacy, College of Pharmacy, Salman bin Abdulaziz University, Al-Kharj 11942, Kingdom of Saudi Arabia

Introduction: Diabetes is a major global public health problem with a dramatic increase. The prevalence of diabetes for all age-groups worldwide was estimated to be 2.8% in 2000 and 4.4% in 2030 and the total number of people with diabetes was projected to rise from 171 million in 2000 to 366 million in 2030 (Al-Shahrani & Hassan et al., 2012). Al-Shahrani & Hassan et al., 2012 says "In the Kingdom of Saudi Arabia; the number of people with diabetes is increasing due to population growth, aging, urbanization, and increasing prevalence of obesity and physical inactivity. The overall prevalence of diabetes was 23.7%, with 26.2% being males and 21.5% females. The calculated age-adjusted prevalence for Saudi population for the year 2000 is 21.9%. Diabetes mellitus is more prevalent among Saudis living in urban areas 25.5% compared to rural areas as 19.5%. Despite the readily available access to healthcare facilities in Saudi Arabia, 28% of diabetics were unaware of having diabetes."

Methods: The research question

Examine the role of pharmacists in providing information and education for diabetic patient

Aim: Examine the role of pharmacists in providing information and education for diabetic patient

Objectives:

1. To enhance the education and training level
2. To evaluate the effectiveness of the role of pharmacists in providing information and education for diabetic patient type 2.

Study design: Quantitative approach using a questionnaire.

Study recruitments methods:

A questionnaire developed by researcher consisting of closed and open questions. Polet & Beck (2010) define the validity of questionnaire as the degree to which the instrument measures what it is intended to measure. The questionnaire should adequately address all aspects of the issues being studied

Data collection methods:

A protocol consisting of written questionnaire will be used to obtain the data.

Data analysis:

Data analyses will be carried out using Microsoft Excel.

Results:

N=41 participants agreed to participate in this research effort and upon selecting "I agree to participate" 36.6% (N=15) worked in a professional capacity in the community pharmacy for more than one month but less than three years, 29.3% (N=12) worked in a professional capacity in the community pharmacy between three and six years, 19.5 % (N=8) worked in a professional capacity in the community pharmacy more than 6 month but less than one year , and an additional 7.3%, (N=3) worked in a professional capacity in the community pharmacy for less than six months and same percentage worked for 6 years or more.

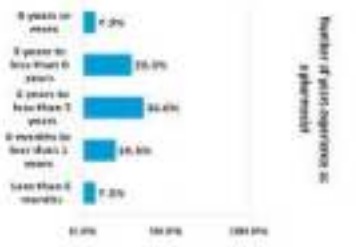

Figure 1: Number of years experience as a pharmacist (n=41)

When participants were asked whether or not they agreed with the statement "The pharmacists clearly

understand their roles and responsibility regarding diabetic patient" the responses were mixed, however the majority were in agreement. A total of 48.8% (N=20) strongly agreed, with an additional 48.8% (N=25) agreeing with the statement directly. An additional 2.4% (N=1) disagreed with the statement indicating they did not understand their roles and responsibility regarding diabetic patient.

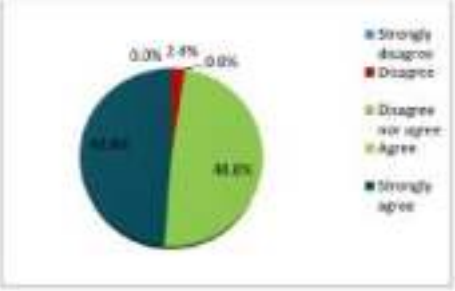

Figure2: The pharmacists clearly understand their roles and responsibility regarding diabetic patient.

Conclusion: The survey instrument successfully identified the roles of pharmacist in providing information and education for diabetic patient (T2DM). In excess of half of all participants also stated they believe the pharmacist spends sufficient time for providing adequate information. Participants identified their perception of the varied impacts related to time a key factor, including time to spend with patients or providing the best time to utilize the medication.

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Knowledge, Attitudes and Practices towards Medication Use among University Students

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Introduction: Medication use is undoubtedly a crucial issue in colleges and among young adults, including medical or nonmedical use of prescription drugs and nonprescription drugs. The increased direct-to-consumer advertising of pharmaceutical products targets the young population, a generation exposed to large amounts of media directing them to self medicate.2 The Centers for Disease Control and Prevention have identified that colleges and universities are important settings for delivering health promotion education and services to young adults.1To successfully implement a rational safe-medication program, study of college students' knowledge, attitudes, and safe medication practices are essential for pharmacists and policymakers to design better strategies for preventing unsafe behaviors.

Use of prescription drugs among college students should be evaluated to prevent inappropriate behaviors. Inadequate knowledge of medication use may directly lead to overuse or patient noncompliance with a drug regimen, and result in serious outcomes. For example, early self-discontinuation of antibiotics, a common behavior in Saudi Arabia, often leads to microbial resistance and/or treatment failure. Misunderstandings among college students about

proper prescription drug use should be corrected to prevent negative outcomes.

The medication practices occurring in the young population reveals the complex relationships between health knowledge, attitudes, and behaviors, which must be considered in order to deliver effective health education. Medication consultation is a direct method of promoting safe use of medication.

However, without first understanding college students' medication knowledge, attitudes and Practices effective intervention cannot be designed.

Aim and objectives

The objectives of this study were (1) to assess college students' Knowledge of drugs. (2) To assesses students' attitudes and practices toward nonprescription medicines, medication consultation with pharmacists, and appropriate use of medicines among non-medical university Students in Alriyadh and Alkharj.

Methods: An extensive literature search (in pubmed, google scholar and medline) was carried out to identify original articles exploring knowledge, attitudes and practices university students towards medication use.A questionnaire was developed based on previously publishedstudies.3,4

Pilot testing was carried out with 6 students to examine the clarity of items in the questionnaire, and acceptability of questionnaire length. The questionnaire was written and conducted in English Arabic. The final form of the questionnaire comprised 16 items with pre-stratified choices. The questionnaire form consisted of three sections. The first section asks about personal information and demographics of participant. The second section assesses college students' knowledge of drugs. The last section assesses students' Attitudes and practices toward nonprescription medicines, medication consultation with pharmacists, And appropriate use of medicines.

A cross-sectional study was conducted among students between April 2014 and July 2014. A stratified sampling technique was employed and samples were taken from 3 different universities in Ariyadh and Alkharj (Salman Bin Abdulaziz, King Saud and Imam Muhammad Ibn Soud).

Data were analyzed using SPSS version 20.

Results: A total of 300 students in 3 universities (Salman Bin Abdulaziz, King Saud and Imam Muhammad Ibn Saud completed the survey. The students'ages ranged from 19–24 years, 115(39%) students at Salman Bin Abdulaziz university, 90(30%) students at King Saud university and 95(31%) students at Imam Muhammad Ibn Saud university.

Table (I) shows the distribution of students among different college

University	colleges	Count
Salman Bin Abdulaziz	Science Colleges	65
	Humanities Colleges	50
King Saud	Science Colleges	40
	Humanities Colleges	50
Imam Muhammad Ibn Saud	Science Colleges	45
	Humanities Colleges	50

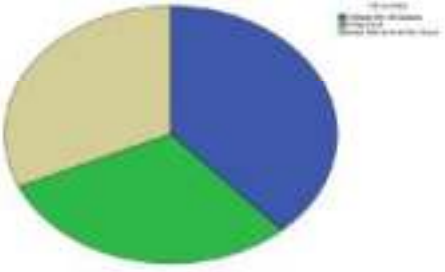

Figure (I) shows the distribution of students from different university.

Table (II) Medication Knowledge Questions

-57% (N=172) of students thought that Antihypertensive drugs could be discontinued when blood pressure returns to normal range.

-47% (N=142) didn't know that Overuse of panadol (acetaminophen) will cause liver toxicity.

-58 % (n=173) agreed that antacid should be add into all prescription to avoid GI (stomach) upset.

Table (III) Attitude and Practices Question

-50 % (N=150) didn't bring all medication with them when they visit their physician.

-48 % (N=140) they didn't check with the pharmacists before taking medicine that never used before.

Discussions: The data demonstrate that college students in Alriyadh and Alkharj have poor knowledge concerning medication use, and safe, drug related, practices. Knowledge and attitudes influence patients' behaviors and outcomes. Improvements in knowledge are often correlated with better health practices.

The data indicating inappropriate drug use practices further strengthens the need for medication education. Drug interactions and duplications are inevitable since participants said they almost never informed their doctors and/or pharmacists about the medications they were taking. Consultation with the pharmacists before beginning a new medicine or new dosage was uncommon. These patterns indicate the urgent need to improve safe medication practices.

Many of the problems identified in this study could be improved by various methods. First, in an era of patient centered medical and pharmaceutical care, patients must take more responsibility for proper medication use and identify key questions to ask their pharmacists. Pharmacists not only need to teach patients how to use medications safely, they also need to encourage patient autonomy by teaching them better communication skills.

Finally, it is needed to improve the knowledge, attitudes, and medication use practices among college students.

Conclusions: This study showed that college students in Alriyadh and Alkharj have poor knowledge about proper use of medications and drug safety. Interventions to improve drug knowledge and safe medication practices, such as providing medication information, behavioral simulation, or even cognitive intervention, should be made immediately by pharmacists to improve the safety of medication use in Arlyadh and Alkharj. Future study is needed to correct the practices and improve the medication knowledge of the people of Saudi Arabia.

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Pharmaceutics

Effect of Hydrophilic Polymers on Cyclodexrin Complexation Efficiency, Solubility And Dissolution Enhancement of Silymarine

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INTRODUCTION

Poorly water-soluble drugs often have an erratic absorption profile and very low / highly variable bioavailability because their performance is dissolution rate limited and is affected by the fed/fasted state of the patient.

Silymarine (SLM) is a natural hepatoprotective agent, having anti cancer property as well.

It is a mixture of three flavanolignans, namely, silybin, silydianin, and silicristine, with silybin being most active.

Due to poor water solubility its bioavailability is very low (23 – 47%). (Ghose et . al, 2010)

Cyclodextrin (CD) complexation is known to increase the aqueous solubility of Silymarin. However , excessive use of cyclodextrin has toxicological issues. (Rakesh et.al. 2010)

Solid dispersion with hydrophilic polymers increase solubility of poorly soluble drugs. (Kim et al, 2013)

We hypothesized that little addition of hydrophilic polymers in drug–cyclodextrin binary system may have synergistic effect on solubility and may affect the Cyclodextrin complexation efficiency thereby enabling reduced amount of cyclodextrins thus associated toxicities.

RESEARCH QUESTION

Whether the hydrophilic polymers in Silymarine–beta cyclodextrin (SLM-BCD) binary system would have synergistic or antagonistic effects on solubility of Silymarine?

Whether the hydrophilic polymers would increase or decrease Cyclodextrins complexation efficiency with Silymarine?

OBJECTIVES

Enhancement of solubility and dissolution rate of Silymarine so as to achieve better bioavailability profiles.

Development and physicochemical evaluation of Silymarine beta cyclodextrin inclusion complexes.

Effect of hydrophilic polymers on Cyclodextrins complexation efficiency.

METHODOLOGY

3.1 Standard Plot of Silymarine:

10 mg of standard Silymarine was accurately weighed, dissolved in methanol and diluted with distilled water (DW) to get a concentration of about100 µg/ml.

From this solution, suitable aliquots were transferred into 10 ml volumetric flask and diluted with DW to get concentrations 1, 2, 4, 6, 8, and 10, µg/ml of Silymarine which were then analyzed by double beam UV spectrophotometer at 286 nm.

3.2 Phase solubility studies:

Solubility studies (with beta cyclodextrins, hydrophilic polymers separately and in combination) were performed according to the method reported by Higuchi and Connors, 1965.

Excess amount of Silymarine was incubated at 25°C and 100 RPM in biological shaker with 0-20 mM of beta cyclodextrins solutions or hydrophilic polymers (0-2% w/v) or BCD 0-20 mM containing 0.5% of hydrophilic polymers like hydroxy propyl methyl cellulose (HPMC), poly vinyl pyrrolidone (PVP), Poly ethylene glycol (PEG 6000).

Suspensions were filtered using 0.45 micron membrane filter after 72 hours and amount of Silymarine in

solutions were analyzed by UV spectrophotometer after appropriate dilution.

3.3 Preparation of Inclusion complexes

Binary and ternary inclusion complexes were prepared by kneading one mole of Silymarine and beta cyclodextrin with or without hydrophilic polymers (10% w/w) in 50:50 mixtures of water and ethanol. Mixture was then dried at 60°C in hot air oven, pulverized into fine state and passed through sieve # 80.

3.4 Characterization of inclusion complexes

Prepared inclusion complexes were characterized by using techniques such as FT-IR spectroscopy, XRD and DSC.

3.5 Dissolution studies of inclusion complexes

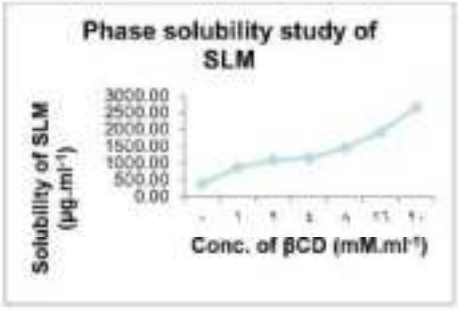
In vitro dissolution studies were carried out in USP dissolution apparatus II using 900 ml of the dissolution medium constituting of 0.1 N HCL pH 1.2 or phosphate buffer pH 6.8 and 1% sodium lauryl sulphate (SLS) at 37°C).

Speed was adjusted to 100 rpm.

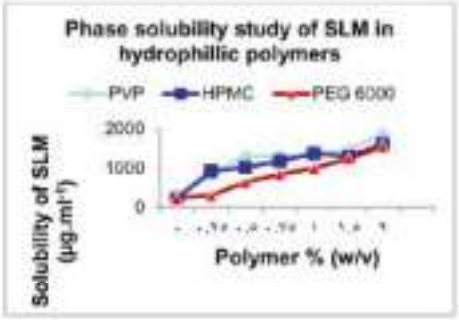
The samples were withdrawn periodically over a period of 2 hours and analyzed using Shimadzu UV spectrophotometer UV-1601.

RESULTS AND DISCUSSIONS

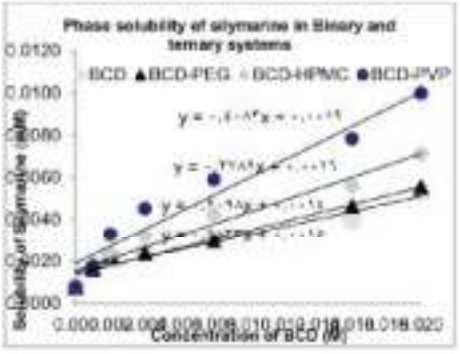
The Phase solubility diagram of SLM in aqueous βCD solutions is shown in fig.1. It demonstrated AL type equilibrium phase solubilty diagram as SLM solubility increases linearly as a function of CD concentration.

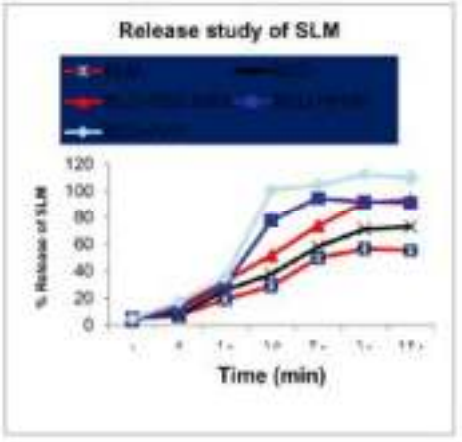


The Phase solubility diagrams of SLM in aqueous solutions of hydrophilic polymer are shown in fig.2. They demonstrate AL type equilibrium phase solubility diagram as SLM solubility increase linearly as a function of polymers concentrations. PVP was found to have maximum solubilizing capacity.



The Phase solubility diagrams of SLM in aqueous βCD solutions in absence and in presence of hydrophilic polymer are shown in fig.3. They demonstrate AL type equilibrium phase solubility diagram for both binary and ternary systems, showing that SLM solubility increase linearly as a function of CD concentration.





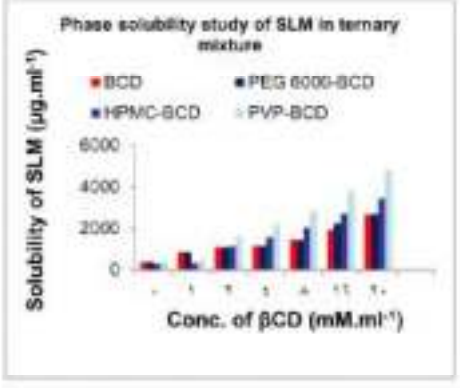


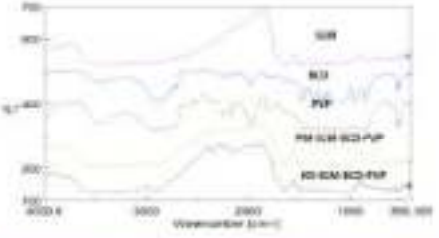
Fig 4: Effect of hydrophilic polymers on solubility of Silymarine in presence of BCD.

Dissolution Rate Study

The dissolution rate of SLM alone and from its CD inclusion complexes was carried out in USP dissolution apparatus II. Dissolution profiles of all tested samples are shown in Fig. 5.

The dissolution studies revealed that about 40% pure SLM was released within two hours; however it was almost completely released from all inclusion complexes with maximum dissolution demonstrated by PVP.

IR curves of pure components, physical mixtures (PM) and ternary inclusion complex prepared by kneading method (KD) are shown in fig.6. These curves were indicative of formation of inclusion complex in solid state. The disappearance of sharp peaks of SLM might be attributed to an amorphous state and/or to an inclusion complexation.



CONCLUSION

On the basis of the physicochemical characterization techniques described in this work, the complex formation between SLM, CDs and water-soluble polymer was confirmed.

Solubility studies showed linear increase in aqueous solubility of SLM with increase in concentration of βCD.

The greater Ks values found for ternary complexes in comparison with the corresponding binary ones suggest a significant improvement on the complexation efficiency between SLM-βCD by addition of small amounts of water soluble polymers.

The addition of hydrophilic polymers resulted in higher complexation efficiency and markedly enhanced the solubilising efficiency of βCD.

In vitro studies in distilled water for inclusion complexes of βCD with hydrophilic polymers showed increase in rates of dissolution several times higher than those of SLM and its complexes with βCD alone.

The finding confirms the addition of small amounts of hydrophilic polymers improves solubilizing and complexing ability of cyclodextrin which further related to increased release of drug in dissolution medium. Study signifies the use of hydrophilic polymers in combination with βCD for the formation of inclusion complex of SLM.

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Formulation and characterization of Ciprofloxacin nanoemulsion for improved solubility

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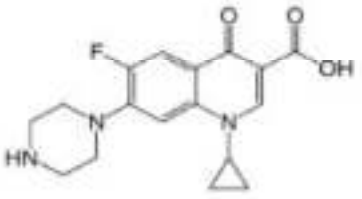
ABSTRACT

At the present study, Ciprofloxacin nanoemulsions were prepared by an emulsification technique. The prepared nanoemulsions were studied for physicochemical characteristics (particle size, zeta potential, and in vitro release). Selection of appropriate parameters enabled the preparation of nanoemulsions with a mean size of 428nm fine particles, zeta potential 93.3mV and high magnitude of cumulative % amount released around 80%. The in vitro release profile showed an initial phase of rapid release of Ciprofloxacin followed by a more gradual release over a period of 24 hrs. The developed nanoemulsions highly safety for use and potential applications of used components in the development of novel drug delivery system

KEYWORDS: Ciprofloxacin, nanoemulsion, characterization, solubility.

INTRODUCTION

Ciprofloxacin is an anti-infective agent of the fluoroquinolone class. The absolute bioavailability of ciprofloxacin is 69% with no substantial loss by first pass metabolism. Peak plasma concentration is 8.3μg/mL, and half life is 4hr. It is almost insoluble in water and alcohol [1]. The stability of the dry substance of ciprofloxacin (figure 1.) is very high at room temperature. Solutions in dialysis fluid (25 mg/L) are stable even after 42 days when stored at 37°C [1].



Nanoemulsions are oil-in-water (o/w) emulsions with mean droplet diameters ranging from 50 to 1000 nm. Usually, the average droplet size is between 100 and 500 nm. The particles can exist as oil-in-water and water- in-oil forms, where the core of the particle is either oil or water [3].

OBJECTIVES

The basic aim of this study was to develop a delivery system to control the release of ciprofloxacin from the carrier system to increase its solubility. In the present study the method was used for the preparation of nanoemulsion is simple and easy to scale up.

MATERIALS AND METHODS

Materials:

Ciprofloxacin was a gift sample from Jazeera Pharmaceutical Industries (JPI), Span 80 and Tween 80 were purchased by Salman Bin Abdulaziz from Sigma-Aldrich. All chemicals used in the study were of analytical grade and used without further purification.

Preparation of Ciprofloxacin Nanoemulsion:

Span 80 and Tween 80 accurately weighed and dissolved in 42.5ml of Dichloromethane in a baker (oily phase). Ciprofloxacin accurately weighed and dissolved in water (aqueous phase), and then the aqueous phase was dropped through a syringe into the oily phase, the two phases were mixed by homogenizer mixer at 700 rpm for 15min at room temperature until a good dispersion of the mixture was obtained (Table 1.).

Formulation Code	Water (ml)	Span: Tween	Cipro (mg)
F1	7.5	0.5:0.5	10
F2	7.5	1:1	10
F3	15	1:1	10
F4	7.5	2:2	10
F5	7.5	4:4	10

CHARACTERIZATION OF NANOEMULSION

Particle Size

Nanoemulsion size and size distribution were determined by Nanotrack analyzer® at a fixed angle of 90° at 25°C.

Surface charge

Zeta potential is an indicator of surface charge, which determines particles stability in dispersion.

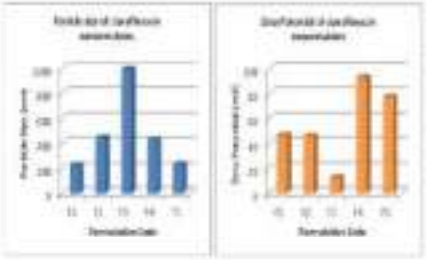
In Vitro Release Study

In vitro release pattern of nanoemulsion preparation was carried out by dialysis bag method. 1g of the nanoemulsion preparation of ciprofloxacin was placed in a dialysis bag (Sigma, 12000 MW cut off). The sac was hanged inside a conical fl ask with 45 ml of phosphate buffer saline (PBS) buffer. The flask was kept in a shaking water-bath at 37°C, 100 rpm. One milliliter samples were withdrawn at specified time intervals (0, 0.25, 0.5, 1.0, 1.5, 2, 3, 4, and 24 hours) and analyzed for drug release by using UV spectroscopic method.

RESULTS AND DISCUSSION

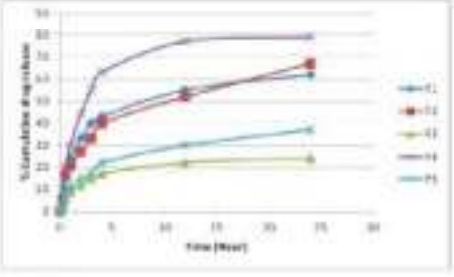
Particle size and Surface charge

Figure 2, presents the mean particle size, zeta potential and weight of prepared ciprofloxacin nanoemulsion of various formulations. The particle size showed a wide range of variability ranging from 220nm to 997nm depending on the water, Span and Tween composition and proportion. The Zeta potential values ranged between 12.5 to 93.3 mV. Zeta potential of F1, F2, F4, and F5 nanoemulsios above + 30 mV indicating that formulation is stable because the charged particles repel one another and thus overcome the natural tendency to aggregate.



In vitro release study

The *in vitro* drug release profiles of entrapped ciprofloxacin from the nanoemulsion formulations are shown in the figure 3. F1, F2, and F4 ciprofloxacin nanoemulsion formulations showed relatively high cumulative drug release with values 62.3%, 67% and 79.4%.



CONCLUSION

The present study demonstrated that ciprofloxacin nanoemulsion can be successfully prepared by emulsification method for improved its solubility. The formula F4 combined all the beneficial attributes of low particle size (428nm), high surface charge density (93.3mV), and high magnitude of cumulative % amount released (around 80%).

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A Comparative in Vitro Evaluation of Different Brands of Paracetamol Tablets Marketed in Saudi Arabia

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ABSTRACT

Paracetamol is a well known representative of non-steroidal anti-inflammatory drugs widely used for relief of headaches, fever, minor aches, pains, cold and flu remedies. The purpose of this study was to determine the pharmaceutical quality of the Paracetamol tablets marketed in Saudi Arabia. Four different brands of Paracetamol tablets were purchased from pharmacy in Saudi Arabia. The results of weight variation, thickness, length, hardness, friability, disintegration time, drug content and drug release of all marketed products comply with established limit.

INTRODUCTION

Chemically, Paracetamol (Acetaminophen) is a N-acetyl-p-aminophenol, is a commonly used over the counter tablets for the relief of headaches, fever, minor aches, pains, cold and flu remedies (Figure 1) (Amit, 2010; Ahmad and Jawed, 2010).Paracetamol is the active metabolite of phenacetin. Paracetamol is generally safe and non toxic for humans at prescribed doses. Overdoses of paracetamol may cause severe liver damage rarely in individuals (Daly et.al, 2008).The quality treatment to the patient mainly based on the quality of dosage form available in the pharmacy, which ensures their good health. Substandard and spurious drugs available in market may affect the patient's health directly. So, continuous evaluation of marketed drugs by the drug regulatory authority (FDA) or a consumer organization, using pharmacopoeial methods enables consumers to be aware of the quality/standard of drugs available to them (Saurabh et.al, 2008). The quality/standard of tablet dosage form should be reliable and generally depends on their formulation properties (e.g. hardness, friability, dissolution), and manufacturing methods (Karmakar and Kibria, 2012).

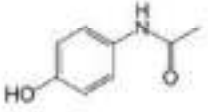


Figure 1: Chemical structure of Paracetamol

The purpose of this study was to evaluate the comparative quality control parameters of Paracetamol tablet marketed in Saudi Arabia, because standard quality parameters are essential for better quality of drugs.

METHODS

Materials

Paracetamol tablets of registered brand available in Saudi Arabia market will be used for the study. Standard paracetamol was purchased from Fluka. All other reagents were of analytical grade and procured commercially.

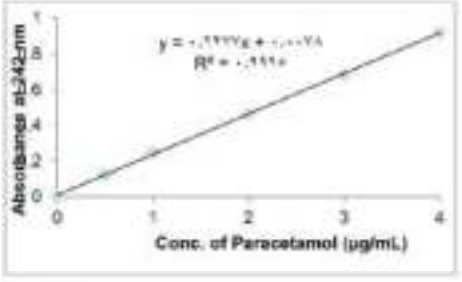
Study Design

In vitro comparative quality parameters between the marketed paracetamol tablets available in Saudi Arabia were evaluated for hardness, friability, weight variation, disintegration time, content uniformity and dissolution profile.

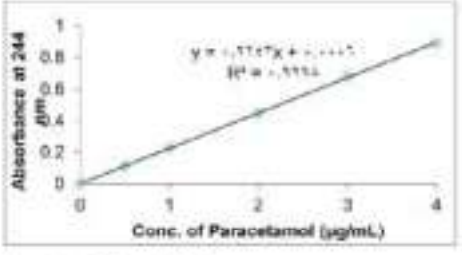
Preparation of Calibration curve

100 mg of pure powder drug (paracetamol) was weighed and dissolved in 10 ml of ethanol and diluted up to 100 ml with 0.1 N HCl (pH1.2) and phosphate buffer (pH7.4) in 100 ml volumetric flask. This was first stock solution and contains 1mg/ml of drug. From first stock solution 10 ml was taken to another 100 ml volumetric flask and diluted up to the mark with

respective solvents and contains 100 µg/ml of drug concentration. From this second stock various other concentrations were prepared like 0.5 µg/ml, 1 µg/ml, 2 µg/ml, 3 µg/ml, 4 µg/ml and 5 µg/ml and absorbance of these concentrations were measured by UV/Vis spectrophotometer at 242 nm and 244 nm for 0.1 N HCl and phosphate buffer respectively. The standard plot were plotted by taking absorbance values on Y-axis and concentration values on X-axis.



0.1 N HCl



Phosphate buffer (pH 7.4)

Fig 1: Calibration curve of Paracetamol

Weight Variation

Ten tablets of each brand were powdered and weighed individually. The average weight and deviation were calculated. According to USP for tablet weighing greater than 325 mg there should not be more than two tablets deviating from the average by no more than 5 percent and none deviated by more twice of 5 percent (10 percent). Weight variations were used to show the uniformity of content of tablet.

Length and Thickness

Random samples of 10 tablets were selected from each of the brand and their length and thickness will be calculated in millimeters using Multicheck V Tester (Erweka, GmbH, Germany).

Hardness test

Hardness of tablet is the strength to withstand mechanical shocks during handling in manufacturing, packaging and transportation (Banker and Anderson, 2009). Hardness /crushing strength of the tablets ranges from 4-7 Kg/cm2 (Musa et al., 2011). Hardness of the tablets were determined using Multicheck V Tester (Erweka, GmbH, Germany).

Friability Testing

Friability test were used to determine ability of tablet to withstand abrasion in packaging, handling and transportation. Friability of the tablets will be determined by using Roche friabaltor (Erweka, GmbH, Germany). Ten tablets of each brand were initially weighed and put into friabalator. The friabalator were set at 25 rpm for 4 minutes (100 revolutions). The percent of friability were calculated using following formula (Kalakuntla et.al, 2010).

$$\% \text{ Friability} = \frac{\text{Weight of the tablets before test} - \text{Weight of tablets after test}}{\text{Weight of the tablets before test}} \times 100$$

Disintegration Test

Disintegration test is used to determine the time required for tablet to disintegrate inside body. A 500 ml beaker was filled with 0.1N HCl at 37±2 oC, and then six tablets were placed in to the each basket of disintegration apparatus (Erweka, GmbH, Germany). The time required to break each tablets into small particles and pass out through mesh present in basket will be recorded. Average disintegration times of tablet were calculated for each brand. The standard disintegration time for conventional tablet is 5 minutes (Gangwar et.al, 2010).

Determination of drug content

The tablets were finely powdered and a quantity of powder equivalent to 100 mg of paracetamol were

accurately weighed and transferred to 100 ml of buffer solution (pH 7.4) and mixed thoroughly. The solutions were filtered, diluted with buffer solution (pH 7.4), and analyzed for the content of ibuprofen using UV-visible spectrophotometer at 244 nm.

Dissolution Test

Dissolution studies of commercially available brands of paracetamol tablets were measured by paddle method in dissolution apparatus (Erweka GmbH, Germany) using 0.1N HCl (pH 1.2) 900 mL at 50 rpm, maintained at 37±0.5°C. Sample (5 mL) was withdrawn at a time interval of 5 minutes for 30 minutes. The filtered samples were diluted and analyzed using UV-VIS Spectrophotometer at 242 nm (Erweka, GmbH, Germany).

DISCUSSION

Four brands of paracetamol tablets were examined for their uniformity of weight and for tablet to tablet variations. It was found that the tablets are of an average weight of 674.9 ± 5.8, 640.2 ± 4.3, 550.2 ± 3.9 and 560.7 ± 3.6 for Panadol, Adol, Panadrex and Fevadol respectively, which is within the limits of the percentage deviation allowed by USP for tablets weighing 325 mg or more.

The Lenght and thickness of paracetamol tablets were found to be within their permissible limit (± 5%).

The hardness of the paracetamol tablets were tested with multicheck V machine varied from 16.3 + 1.3 to 21.8 + 1.1 kp.

Friability test was performed by Roche type friabilator. The friability of all tablets were in the range from 0.09% to 0.18. In all the tablet formulations, the percent friability were less than 1%, which ensures each brand of tablet was mechanically stable.

The four products have disintegration times less than 15 minutes and this complied with the specifications for oral tablets, where BP and USP specification for uncoated tablets and film coated tablets should be 15 and 30 minutes respectively.

The British pharmacopoeia specifies that the content of drug should not be less than 95% and not more than 105%. The content of paracetamol in tablets were found to be 98.2 - 97.1%.

The dissolution studies revealed that at different time intervals drug release rate was better in paracetamol tablet brands. After 5 minutes, the release rates of tablet brands of paracetamol were 13.3 to 18%, whereas release rate tablets were 91.3 to 98.7%.

Brand Name	Content (mg)	Lot No.	Expiry date
Panadol	500	130241	01/2015
Adol	500	0058	04/2017
Panadrex	500	01265	08/2016
Fevadol	500	72776	12/2017

Table 1: Four brands of paracetamol tablets

Brand Name	Content (mg)	Lot No.	Expiry date
Panadol	500	130241	01/2015
Adol	500	0058	04/2017
Panadrex	500	01265	08/2016
Fevadol	500	72776	12/2017

Table 2: Physical properties of tablets

Marketed Tablets	% Friability	Disintegration time	Drug content (Mean ± SD)
Panadol	0.11	6 min 34 secs	98.2 ± 0.70
Adol	0.18	8 min 22 secs	99.1 ± 0.15
Panadrex	0.09	6 min 9 secs	98.2 ± 0.84
Fevadol	0.12	9 min 21 secs	98.5 ± 0.49

Table 3: Physical properties of tablets

Table 4: Release studies of paracetamol tablets

Time interval (mins.)	% Drug release			
	PANADOL	ADOL	PANADREX	FEVADOL
5	18.0	18.0	16.0	13.3
10	44.7	40.0	36.7	31.3
15	64.7	62.7	60.0	56.7
20	90.0	84.0	80.0	74.0
25	96.7	96.7	92.7	84.7
30	98.7	98.7	95.3	91.3

Preoperative Antibiotic Prophylaxis Practice and Guideline Adherence in Riyadh

Yazid mohammed Aldosari, Dr. Haitham tumah & Nehad j Ahmad

INTRODUCTION

Appropriately administered antibiotic prophylaxis reduces the incidence of surgical wound infection. Prophylaxis is uniformly recommended for all clean-contaminated, contaminated and dirty procedures. It is considered optional for most clean procedures, although it may be indicated for certain patients and clean procedures that fulfill specific risk criteria.

AIM

The aim of the study is to assess the practice of surgical antibiotics prophylaxis and adherence of practitioners in Riyadh hospitals to the American society of health system pharmacist's guidelines for antimicrobial prophylaxis in surgery and to explore reasons for non-compliance.

METHODOLOGY

A cross – sectional study was conducted in three hospitals in Riyadh (King Soud Medical city hospital, Armed forces hospital and Al-Hammadi hospital) since 16-2-2014. A questionnaire was designed to collect information from physicians regarding the practice of surgical antibiotic prophylaxis, references used for guiding surgical antibiotic prophylaxis practice prevalence of surgical site infection and causative microorganisms.

RESULTS

A total of 30 surgery physicians filled the survey

The survey shows that physicians depend mainly on textbook and guidelines

About 1.5 % of the physicians correctly employed SAP for clean and,34.3% for clean-contaminated surgeries. However, 32.8 % used SAP incorrectly for contaminated surgeries, and 31.3% for dirty operations

The most common pathogens causing surgical site infection were Staphylococcus aureus 48.7% and Escherichia coli 33.35 %.

About 37% of physicians used more than two doses of SAP, 18.5% used two doses, and 44.44% used only one dose.

57.7 % said that surgical site infection rates were 1-5%

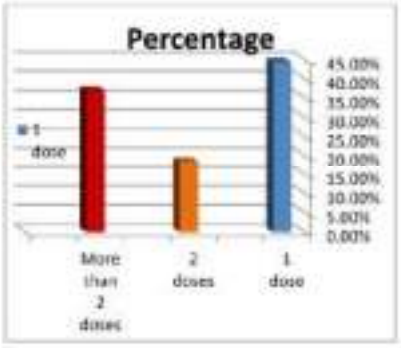
The most commonly used antibiotic for surgical prophylaxis was cefuroxime followed by ceftriaxone

The first dose of the first choice antibiotic regimen administered less than 1 hr before operation in 36.67 % and at the time of induction of anesthesia in 43.33 %

The antibiotic regimen is administered over up to 1 day in 70 % of Cases

53.57 % said that the hospital doesn't have a clinical pathway or a clinical guideline of antimicrobial prophylaxis for surgery.

How many times is the patient given that antibiotic regimen?



Based on surgical wound classification, in which do you use an antibiotic?

Discussion

In this study, we assessed the practice and adherence to the American Society of Health-System Pharmacists (ASHP) guidelines for antimicrobial prophylaxis prior to surgery and explored reasons for non-compliance.

Our study shows that there were inconsistencies between ASHP guidelines and current practice. Similar findings were reported in a previous study conducted in Jordon.

In contrast to other studies, our results indicated that 43.33% of physicians administered the SAP at the time of anesthesia induction. This is considered the correct timing according to ASHP guidelines for most procedures, since this ensures adequate antibiotic concentrations in the targeted tissues during the period of potential contamination.

The first-generation cephalosporin, cefazolin is regarded as the antimicrobial agent of choice for most procedures according to ASHP guidelines. It has a relatively long duration of action, is effective against the most commonly encountered organisms in surgical procedures, and has a relatively low cost.

CONCLUSION

In conclusion, physicians in Riyadh hospitals are aware of the importance of antimicrobial prophylaxis before surgical procedures. However, further efforts are needed to ensure the implementation of the accepted practices of SAP in Riyadh hospitals. This might be achieved by establishment of effective continuous medical education programs for physicians and pharmacists, and periodic assessment of compliance with evidence-based SAP guidelines.

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Design and Evaluation of Orally Disintegrating Delivery System for Geriatric Patients

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Department of Pharmaceutics, College of Pharmacy, Salman Bin Abdulaziz University

INTRODUCTION

The need for delivering drugs to patients efficiently and with few side effects has prompted pharmaceutical companies to engage in the development of new drug delivery system. A solid dosage form that dissolves or

disintegrates rapidly in oral cavity, resulting in solution or suspension without the need of water is known as fast dissolving dosage form or oral dissolving tablets. (ODTs).

ODTs offers a solution for pediatrics, geriatrics; psychiatric or mentally ill people and those have difficulty in swallowing tablets/capsules resulting in improved patient compliance.

AIM

The objective of the current work is to design and evaluation of orally disintegrating tablets (ODTs) of particular CNS drug to be used for geriatric and difficulty swallowing patients.

METHODS

Table 1. Composition of developed orally disintegrating tablets (w/w % of the Tablet Weight)

Ingredients	% Amounts
Drug	6.67
Avicel PH102	30
Spray dried lactose	58.33
Sodium starch glycolate (SSG)	4
Magnesium stearate	1

Figure 1: Process flow chart for ODTs manufactured by direct compression technique

The resulting tablets were evaluated according to USP guidelines for physical properties: weight variation (n=20), thickness, (n=10), mechanical strength (n=10), friability (n=20) and in-vitro disintegration (n= 6). Content uniformity for all batches was evaluated according to USP specifications.

In-vitro drug release was performed according to the USP26 "Dissolution procedure" over 60 minutes, in apparatus 2 at 50 rpm. The media used was phosphate buffer (pH 6.8) and a volume of 900 ml and maintained at 37±0.5C°.

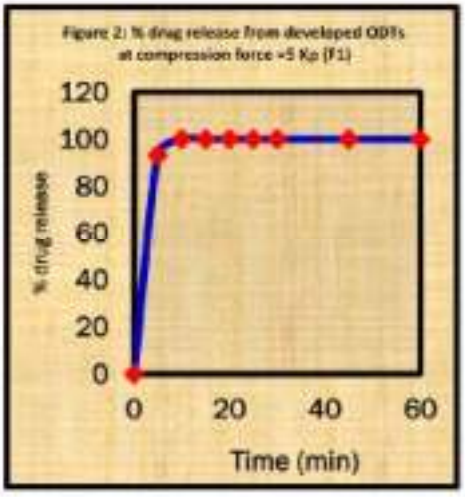
RESULTS

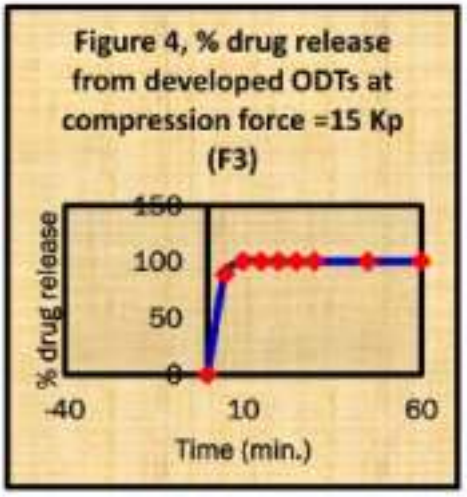
Table 2. Physical properties of developed orally disintegrating tablets.

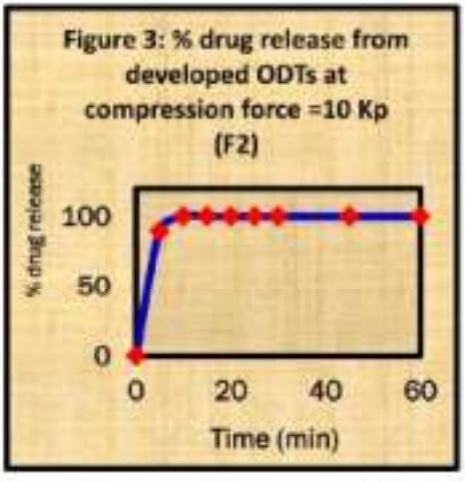
All results are expressed as (Mean ± SD)

Test	F1	F2	F3
Weight variation (mg)	299.3 ± 1.7	310.3 ± 1.5	297.0 ± 1.6
Thickness (mm)	4.51 ± 0.02	4.17 ± 0.02	4.09 ± 0.01
Diameter (mm)	9.96 ± 0.02	10.00 ± 0.01	9.97 ± 0.01
Hardness (Kp)	3.8 ± 0.3	4.2 ± 0.3	8.0 ± 0.5
Friability (%)	0.8	0.32	0.16
Disintegration (Seconds)	11.89 ± 0.07	20.07 ± 0.5	27.98 ± 1.91
Content uniformity (%)	99.96±0.79	99.06±1.92	98.40±1.11

As shown in the table 2. The content uniformity of all formulations was between 98 and 99% and was in acceptable range according to USP specification. Also, hardness of all tablet formulation was within acceptable range and ranged between 3.8 and 8.0 due to gradual increase of the compression force. In addition, all tablet formulation showed less than 1% friability and passes weight variation test. Moreover, all formulation showed low disintegration time between 11 and 27 seconds.







On the other hand, figure 2, 3, 4 were showed the in vitro release behavior of the 3 formulation. All the formulations release more than 80% of the drug within the first 5 min, which prove it's fast dissolving action.

CONCLUSIONS

Based on the previous results, orally disintegrating tablets could be developed using simple manufacturing technology as direct compression technique. ODTs prepared by direct compression usually have good mechanical properties. ODTs can improve patient compliance, provide a rapid onset time of action, and increase bioavailability

Development and Validation of RP-HPLC Method for the Analysis of Quercetin from Natural Sources by Using Green Solvent

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INTRODUCTION

Quercetin, chemically is 2-(3,4-dihydroxyphenyl)-3,5,7-trihydroxy-4H-1-benzopyran-4-one,major representative of flavonol, subclass of flavonoids widely distributed in fruits and vegetables. Major parts of nutritional supplements and considered as active moieties of many medicinal plants. They have potent antioxidant, Anti-diabetic and anti tumor, and antiviral, anti-inflammatory properties (Spencer et al 2008).

Most of consumable foods in Saudi Arab e.g. rocket (Erica Sativa), as well as common fruits such as green apple, onion, green tea, lemon as well as many seeds, flowers, barks, and leaves are major source of Quercetin.

It is poor or slightly soluble in water. It is chemically unstable in aqueous intestinal fluids as well as it is poorly orally absorbed (Zheng et al 2005).

Several method were cited in literature to determine the Quercetin from natural sources and human plasma these include HPLC method with DAD and UV detector (Xiao-qing Chen et al 2005, K. Vijaya Sri, et al 2009, Ch. R. S. Phani et al 2010, HaiPeng Liu et al 2011,G. Gulati, et al 2012, Neelam Verma et al 2013).

Application of cyclodextrin in liquid chromatography as mobile phase additives, were cited in literature (Shailesh M. Buha et al 2012, C. Yanez et al 2007, Gyula Oros et al 2013).

As there is no reported method on HPLC with β-cyclodextrin (β-CD) inclusion complex liquid chromatography of Quercetin.

Hence it is proposed to develop and validate RP –HPLC methods with UV detection for the estimation of Quercetin in most consumable plants in Saudi Arab.

Formula: C15H10O7

Fig 1: Powder drug

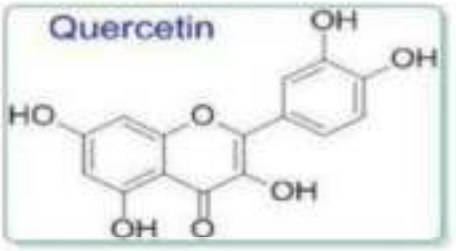


Fig 2: Chemical structure of Quercetin

OBJECTIVES

To develop HPLC method for the assay of Quercetin from plant (natural source).

The use of β-cyclodextrin (β-CD) or (2-hydroxypropyl)-β-cyclodextrin (HPβ-CD) as mobile phase additives are proposed to increase the proportion of water in the mobile phases without loss in the resolution or efficiency of the separations.

To validate the developed methods as per ICH guideline.

METHODOLOGY

Materials and reagents: All solvents are filtered

Quercetin was from Sigma Aldrich, Plants were from local market

Preparation of stock and working standard solution: About 5 mg of standard Quercetin was accurately weighed and dissolved in 50 ml ethanol as diluents to get a concentration of about100 µg/ml. From this solution, suitable aliquots were transferred into 10 ml volumetric flask and diluted with mobile phase to get concentrations 2, 4, 6, 8, 10, 12 and 14 µg/ml of quercetin 10 µl of each of the solution was injected into the column using optimized chromatographic conditions.

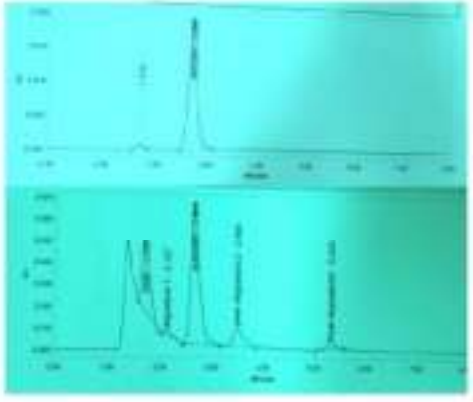
Preparation of test sample: About 1gm of methanolic extract of Erica Sativa was weighed. A quantity of extract equivalent to 5 mg of quercetin was placed in a 50 ml volumetric flask, dissolving it with ethanol as

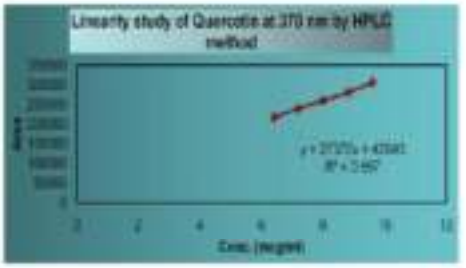
diluents. This solution was sonicate for 20 min to dissolve. Once the time had elapsed and the volumetric flask reached the environmental temperature (25o C). This solution was filtered through whatmann filter paper no-44 to get the clear solution. An 800 Ml of aliquot was transferred to 10 ml of volumetric flask and the final volume was made with same mobile phase. Out of this solution obtained, a proportion was taken & filtered through a FH membrane filter (0.45 lm) using micro syringe in an HPLC vial.

Chromatographic conditions:

Mobile phase consisted of 70% of Methanol and 30% of water having β cyclodextrin (5mM) with 0.1 % orthophosphoric acid was circulated through a stainless steel analytical column (Lichrosphere-100, RP 18, 25cm Ɨ 4.6mm ID, 5lm) at flow rate of 1.0 ml, min-1. The variables UV-VIS detector was set at 370 nm.

Fig 3: Chromatogram of quercetin (A) specificity study with NaOH, (B) Standard (C) Test sample





Fig; 4- : Calibration curve of Quercetin in Methanol: water (β-Cyclodextrin /0.1% OPA) (70:30 v/v) at 370 nm for linearity study

Linearity: To carry out this study five concentration levels of within the range of 80 to 120% of the target concentration (8 µg/ml) were prepared, and analyzed immediately after their preparation. The experimental results were represented graphically, obtaining a calibration curve and carrying out the corresponding statistic study. (Fig.4)

Precision: It was carried out at two levels of ICH suggestions i.e. repeatability and intermediate precision. Repeatability or intra-day precision was carried out by nine determinations at three concentration level, 80%, 100% and 120 % in one laboratory on one day. Intermediate precision was carried out by analyzing the same sample in second day as same way. Results of repeatability and intermediate precision were expressed in terms of % RSD. (Table.1)

Table No. 1: Results for Intraday and Inter-day Precision study of Quercetin

Amount taken Conc. (µg/ml)	Mean Found* Conc. (µg/ml)	±SD	% RSD	SEM
Intra-day precision				
6.4	6.291948	0.03055	0.4858863	0.01764
8	8.483711	0.07	0.8251126	0.0404
9.6	9.675888	0.06	0.5025428	0.0351
Inter-day precision				
6.4	6.606675	0.03055	0.4838923	0.01764
8	8.214305	0.07	0.7996883	0.0404
9.6	10.0725	0.06	0.5610524	0.0351

*, n=3: Average of three determinations,

Estimation of Quercetin from Methanolic extract of Erica Sativa:

The quantification of analytes in plant extract, were determined by recording of area of all peaks. Corresponding concentration of quercetin against respective area value was determined by using the calibration curve. The statistical analysis of checking uniformity in batches was also performed. (Table. 2)

Accuracy: Accuracy was studied using the standard addition method. Prepared the standard and test solution containing (8 µg/ml) concentration of the drug. Standard solution was added to the pre-analyzed sample and three concentrations levels i.e. 80, 100 and 120% of the target concentration of test sample were prepared. Then analyzed these solutions in triplicate, found out the concentration of recovery of drug from calibration curve by intercept corresponding to measured peak area. Then calculated the percentage recovery of sample at each level. R.S.D. was also calculated. (Table.2)

Table No. 2: Results of accuracy study and assay of the proposed method

Level %	Amount Added (µg/ml)	Amount Recovered* (µg/ml) ± S.D	% Recovery± S.D	%RSD
80	14.4	14.74422 ± 0.02000	102.3584 ± 0.8074	0.806216
100	18	18.19842 ± 0.8021	101.1791 ± 0.8074	0.717766
120	21.6	17.93764 ± 0.8016	101.4447 ± 0.7888	0.702322
			Mean 101.84%	Mean 0.3%
Assay (Quercetin)	8 mg/g	8.2	102.56 0.8074	0.27

*, n=3: Average of three determinations.

RESULTS AND DISCUSSION

A robust, specific, accurate, precise and sensitive HPLC method was developed for the estimation of quercetin in most consumable plant i.es Erica sativa available in Saudi Arab.

During optimization of RP-HPLC, we initially used mobile phase comprising organic phase with green solvent. So we tried the β-Cyclodextrin in different molar concentartion as green solvent. Since quercetin peak obtained was asymmetrical, we re-adjusted the mobile phase and found that methanol with water having 5mM cyclodextrin and 0.1% ortho phosphoric acid at ration of (70: 30v/v) yields a highly symmetric quercetin peak at flow rate of 1.0 ml /min at room temperature.

The developed method was validated as per ICH guideline 1996 by using all validation parameters. The results of all the validation parameters of quercetin were found to be as follows specificity (absence of any interference of analytes peak with degradation product under alkaline condition) showed the main peak of analyte at 2.64 min, and degradent peak at 2.1, 3.4 and 5.3 min, linearity (0.997), intraday and intermediate precision at three concentration level as % RSD (0.4550,0.7251, 0.5075; 0.4859,0.7999,0.5618), accuracy at three concentration level as % recovery (102.3 ± 0.8074,101.17± 0.9074,101.66 ± 0.1856), limit of detection; LOD (0.0000364µg mL^{-1}) and limit of quantitation, LOQ (0.00011 µg mL^{-1}) and robustness (in significant variations expressed as % RSD 0.13).

The Applicability of method was presented by assay results of quercetin in plant.

CONCLUSION

The RP-HPLC method was successfully developed in this study for the determination of Quercetin contents in Erica Sativa. The data show that RP-HPLC is a powerful technique for this purpose which has the potential benefits of high sensitivity, accuracy, reproducibility and time saving.

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Pharmaceutical chemistry

Synthesis, Spectral Characterization of substituted anthranilic acid analogues for antimicrobial agents

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INTRODUCTION

Substituted anthranilic hydrazide analogs have been reported to possess a variety of activities including antimicrobial activity[1, 2, and 3].

In the present study we attached anthranilic acid hydrazide with different substituted benzene sulphonyl chloride derivatives to come up with strong new derivatives that have a pronounced antimicrobial activity.

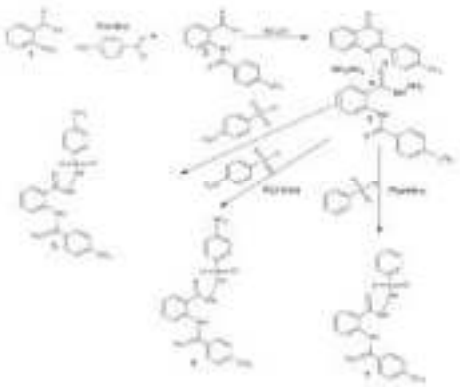
EXPERIMENTAL METHODS

Chemistry: N-(4-Methylbenzoyl)-anthranilic acid: 4-methyl benzoyl chloride (0.05 mol) was added drop wise to a stirred solution of anthranilic acid (0.05 mol) in dimethyl formamide (50mL) and the reaction mixture was stirred at room temperature for 2hr. Water (100 mL) was added with stirring and the separated solid was washed with water, dried and crystallized from ethanol. M P: 162^{0}C; Yield: 80%IR: 3300-2500(OH), 1730(C=O).

2-(4-Methyl phenyl)-4H-3,1-benzoxazin-4-one:A mixture of N-(4-methyl phenyl) anthranilic acid (0.01 mol) and acetic anhydride (20mL) was heated under reflux for 3h. Excess acetic anhydride was evaporated under reduced pressure and the obtained solid was crystallized from ethanol. M P: 170-172^{0}C; Yield: 82%

4-methyl benzoyl chloride(0.05 mol) was added drop wise to a stirred solution of anthranilic acid (0.05) in dimethyl formamide (50mL) and the reaction mixture was stirred at room temperature for 2hr.Water(100 mL) was added with stirring and the separated solid was washed with water,dried and crystallized from ethanol.

Scheme:



2-(4-Methyl benzyl amine)-anthranilic acid hydrazide:

A mixture of 2-(4-methyl phenyl)-4H-3,1-benzoxazin-4-one (0.003 mol) and 90% hydrazine (0.75g, 0.015 mol) in ethanol (20mL) was heated under reflux for 2h. The solvent was evaporated under reduced pressure and the obtained solid was washed with water, dried and crystallized from ethanol M P: 230-231, Yield: 60%, IR,3350-3300(NH2),3250(NH),1685(C=O),1670(C=O),1H-NMR(DMSO-d6):δ2.0(5,2H,NH-NH2),2.31(S,3H,CH3), 7.18(m,1H,benzene)7.24-7.83(dd,4H,toluene ring), 7.49(m, 1H,benzene),δ(d,1H,benzene), 7.93(d,1H,benzene).

δ(S, 1H, O=C-NH-NH2) 18.6(S,1H,Ph-NH-CO).

Synthesis of Compounds (5, 6, 7)

A mixture of anthranilic acid hydrazide (0.003) and appropriate benzene sulphonylchloride derivatives and dry pyridine (20mL). The reaction mixture was heated under reflux for 18h. The pyridine layer layer was cooled and poured cool acidulated water (10%) with stirring. The obtained solid was filtered, washed with water and recrystallized from ethanol.

Antimicrobial Activity:

Antibacterial studies

The newly synthesized compounds (5, 6, 7) will be screened against Gram negative bacteria (E.Coli), Gram

positive bacteria (S.aureous, β-subtilis (recultured) bacterial strains by disc diffusion method4, 5. Zones of inhibition were calculated and compared with the controls carefully.

Antifungal studies

All the compounds (5, 6, 7) will be screened for their antifungal activity using C. albicans and A. niger in DMSO solvent by agar diffusion technique6,7. Fungal zones of inhibition will be calculated and compared with the controls.

RESULTS AND DISCUSSION

Chemistry: All the compounds are well characterized by NMR and characteristics protons confirmed the desired compounds (4, 5, 6).

Antimicrobial activity: The series of desired compounds under study will be sent to the microbiological department for the antibacterial and antifungal activity against selected strains.

REFERENCES

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ACKNOWLEDGEMENTS

The authors are grateful to all the teaching staff of Department of Pharmaceutical Chemistry Salman Bin Abdulaziz University for present research.

Synthesis, Spectral Characterization of N- Substituted Benzamide Derivatives as Antimicrobial Agents

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Department of Pharmaceutical Chemistry, College of Pharmacy, Salman binabdulaziz University,

Al-Kharj, Saudi Arabia

INTRODUCTION

N-Substituted benzamide derivatives has been reported to be immense biological properties including antimicrobial potency[1, 2].

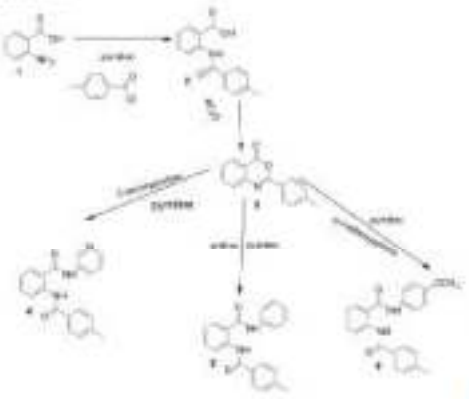
The number of life threatening infections caused by multidrug-resistant has reached an alarming level around the corner[3, 4].

As a combination of previous efforts aiming to locate new active benzamide analogs containing antimicrobial agents with enhanced potency.

A new series of 2-(4-methylbenzoylamid-N-Substituted benzamides were synthesized and screened against certain starins of Gram negative bacteria, Gram positive bacteria and pathogenic fungi.

EXPERIMENTAL METHODS

Schemec



2-(4-methylbenzoyl amino)-benzoic acid (2)

Reaction of anthranilic (0.01 mol) with 4-methyl benzoyl chloride (0.012 mol) in pyridine (30mL) at room temperature with stirring for 3hrs. The reaction mixture was poured in cold ice. The resultant solid was filtered, washed with water, dried and recrystallized from acetic acid to give (2) in 70% yield, m.p 280-281.

(DMSO-d6) δ 2.35(S, 3H, CH3-) 7.09(dd, 2H, aromatic) 7.5-7.6 (m,4H, aromatic, 2H,-----),8.1(dd,1H,quinazoline).

Synthesis of benzoxazine derivative (3)

Benzoic acid derivative 2 (0.85 mol) was refluxed in large excess acetic anhydride (50 mL). The solvent was evaporated under vacuum and the resultant solid was washed with petroleum ether dried to give (3) in 60% yield, m.p 191-194.

2-(4-Methylbenzoylamino)-N-Substituted benzamides

A mixture of 2 (4-methyl phenyl)-4H-3, benzoxazine-5-one (0.01 mol) and appropriate aromatic amine (0.03 mol) in aniline (20 mL) was heated under reflux for 3hr. The reaction mixture was cooled poured into cold acidulated water (10% HCl) and stirred. The obtained solid was filtered, washed with water and recrystallized from glacial acetic acid to give 4, 5, 6 respectively m.p. 201-203,221-223,228-230. Yield 50-60%.

(DMSO-d6) δ 2.35(S,3H,CH3-), 7.6(dd,1H, aromatic) 7.18-7.24(m, 5H, aromatic) 7.49(dd,1H, aromatic) 7.64(dd,2H,aromatic) 7.82-7.83(m,3H,aromatic) 7.93(8.0(bs, 2H,aromatic)

Antimicrobial Activity:

Antibacterial studies

The newly synthesized compounds (3, 4, 5) will be screened against Gram negative bacteria (*E.Coli*), Gram positive bacteria (*S.aureous*, *B-subtilis* (recultured) bacterial strains by disc diffusion method[5,6]. Zones of inhibition were calculated and compared with the controls carefully.

Antifungal studies

All the compounds (3, 4, 5) will be screened for their antifungal activity using *C. albicans* and *A. niger* in DMSO solvent by agar diffusion technique[7,8]. Fungal zones of inhibition will be calculated and compared with the controls.

RESULTS AND DISCUSSION

Chemistry: All the compounds are well characterized by NMR and characteristics protons confirmed the desired compounds (4,5,6).

Antimicrobial activity: The series of desired compounds under study will be sent to the microbiological department for the antibacterial and antifungal activity against selected strains.

REFERENCES

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ACKNOWLEDGEMENTS

The authors are grateful to Dean College of Pharmacy and all the teaching staff of Department of Pharmaceutical Chemistry Salman Bin Abdulaziz University to create nice atmosphere for the present research for the undergraduate students.

Synthesis of Quinazoline Derivatives and their Antimicrobial Activity

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Department of Pharmaceutical Chemistry, College of Pharmacy, Salman binabdulaziz University, Al-Kharj, Saudi Arabia

INTRODUCTION

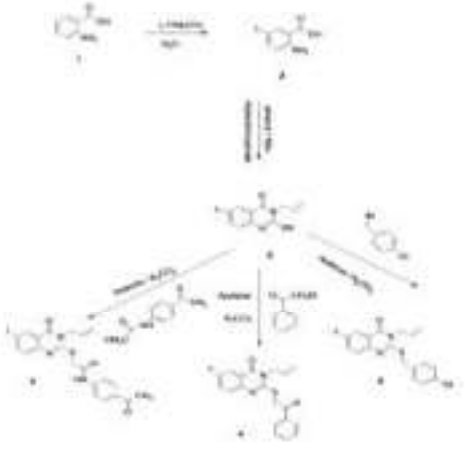
Quinazoline are important class of organic moiety possessing diverse range of biological activity including antimicrobial[1,2]

There is a great need for new class of antimicrobial agents as the old one has number of drawback specially related to resistance to microbes [3,4].

EXPERIMENTAL METHODS

Chemistry: 6-Iodo-4-allyl-3H-quinazolin-4-one(2). A mixture of the 2-thioxanalog(2)(0.01mol) was reacted with allylbromide or bromoethanol and or ethyl bromide(0.012mol) and anhydrous potassium carbonate (2gram) in acetone (50 ml), was heated under reflux for 12 hr. solvent was evaporated, dried. The obtained residue was washed with water, dried and recrystallized from ethanol to give 3,4,5 respectively with 60,65,68% yield.

Scheme:



Compound 3: ^{1}H NMR,(DMSO d_6) δ 1.2(t,3H,CH_3-CH_2-), 2.3(S, 3H, CH_3-C=O),3.81(S,2H,S-CH_2CO), 3.87 (d, 2H,NCH_2-CH=CH_2),5.15-5.17(t,2H,N-CH_2-CH=CH_2),7.2-7.84(m, 6H, benzene and qunazoline), 8.1(S,1H,O=C-NH-ph) 8.3(S,1H,quinazoline).

Compound 4: ^{1}H NMR,(DMSO-d_6) δ 3.87(d,2H, N-CH_2-CH=CH_2), 4.13(S, 2H, S-CH_2-CONH), 5.15-5.17 (t, 2H,N-CH_2-CH=CH_2), 5.38 (m, 1H,N-CH_2-CH-=CH_2), 7.37-7.65(m,3H,benzene), 7.85-7.9 (dd,3H-qunazoline and benzene), 8.3(d,1H, quinozoline).

Antimicrobial Activity:

Antibacterial studies

The newly synthesized compounds (3,4,5) will be screened against Gram negative bacteria (*E.Coli*),Gram positive bacteria (*S.aureous, B-subtilis* (recultured) bacterial strains by disc diffusion method[5,6]. Zones of inhibition wore calculated and compared with the controls carefully.

Antifungal studies

All the compounds (3, 4, 5) will be screened for their antifungal activity using *C. albicans* and *A. niger* in DMSO solvent by agar diffusion technique[7,8]. Fungal zones of inhibition will be calculated and compared with the controls.

RESULTS AND DISCUSSION

Chemistry: All the compounds are well characterized by NMR and characteristics protons confirmed the desired compounds (4,5,6).

Antimicrobial activity: The series of desired compounds under study will be sent to the microbiological department for the antibacterial and antifungal activity against selected strains.

REFERENCES

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Synthesis newer quinazoline derivatives: Search for antimicrobial agents

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INTRODUCTION

Antibiotic resistance has become a serious problem among pathogenic bacteria for the management of many infectious diseases and has resulted in a clear need for novel antibacterial agents other than analogs of existing antibiotics[1,2].

It was reported that quinazolines has an interesting antimicrobial activity against different species of pathogenic Gram positive bacteria, Gram negative bacteria and Fungi[3].

In this study a series of 2-(4-methyl phenyl)-iodoquinazoline carrying different acyclic or hetorocyclic moieties were reported and subjected to antimicrobial screening.

Interaction of anthranilic acid with 4-methyl benzyl chloride in dimethyl formamide yielded N-(4-methyl phenyl)-anthranilic acid 2 which was subsequently cyclized to benzoxazine derivative 3. Condensation of 3 with formamide yielded the target quinazoline derivative 4 which was reacted with certain alkyl benzyl halides to give target compounds 5, 6, 7.

EXPERIMENTAL METHODS

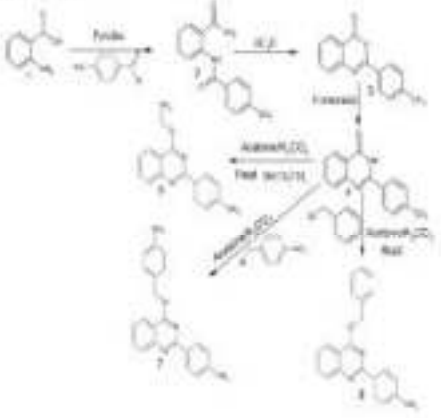
Chemistry:

General procedure for the synthesis of compounds 2-(4-methyl phenyl)-4-ethyl or substituted benzyl oxy-quinazolines(5,6,7).

A mixture of 2-(4-methyl phenyl)-3-,4-dihydroquinazoline-4-one 4(0.003 mol), ethyl bromide and/or appropriate benzyl bromide(0.005 mol) and anhydrous potassium carbonate(2g) in dry acetone (30 mL) was heated under reflux for 18hr and the reaction mixture was filtered while hot. The filtrate was evaporated under vacuum and the separated solid was washed with water and recrystallized from ethanol to give compounds 5, 6, 7, yield (60-70%). MP 130-131, 183-185, and 191-192.

^{1}HNMR(CDCl$_3$)δ:81.33(t,3H,CH_3-CH_2-O), 2.31(S,3H,CH_3),3.38(q,2H,CH_3CH_2-O),7.12-7.39(dd,4H,aromatic),8.01(d,1H,quinazoline)

Scheme:



2-(4-methyl phenyl)-3, 4-dihydroquinazoline-4-one

A mixture of 2-(4-methyl phenyl)-4H-3, 1-benzoxazin-4-one (0.05 mol) in formamide (30 ml) was heated under reflux for 2hr. On cooling the separated solid was washed with water and crystallized from acetic acid MP>300, yield (57%). IR: 3150(NH) 1685(C=O) ^{1}HNMR (DMSO-d_6) δ 2.31(S, 3H, CH_3),7.09-7.50(dd, 4H, aromatic proton),7.4-7.5(m,3H,quinazoline),7.9(d,1H,NH).

Antimicrobial Activity:

Antibacterial studies: The newly synthesized compounds (3,4,5) will be screened against Gram negative bacteria (E.Coli),Gram positive bacteria (S.aureous, β-subtilis (recultured) bacterial strains by disc diffusion method[4,5]. Zones of inhibition were calculated and compared with the controls carefully.

Antifungal studies: All the compounds (3, 4, 5) will be screened for their antifungal activity using C. albicans and A. niger in DMSO solvent by agar diffusion technique[6,7]. Fungal zones of inhibition will be calculated and compared with the controls.

RESULTS AND DISCUSSION

Chemistry: Final compounds are well characterized by NMR and characteristics protons confirmed the desired compounds.

Antimicrobial activity: The final compounds under study will be sent to the microbiological department for the antibacterial and antifungal activity against selected strains.

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1. Sharma S, Athar F, Maurya M R, Azam A, *Eur J Med Chem*, 40(2005) 1414.

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ACKNOWLEDGEMENTS

I am thankful to the Dean College of Pharmacy and all the teaching staff of Department of Pharmaceutical Chemistry, Salman Bin Abdulaziz University for the present research.

Synthesis, Spectral Characterization of Substituted Quinazoline Derivatives for Antimicrobial Agents

Raed Sayeed, Dr M Afroz Bakht

Department of Pharmaceutical Chemistry, College of Pharmacy, Salman binabdulaziz University, Al-Kharj, Saudi Arabia

INTRODUCTION

Quinazolines, a nitrogenous hetrocycles, proved to hold numerous biological activity including antimicrobial activity[1,2].

Certain quinazoline analogues show a remarkable activity against the opportunistic infections caused by Gram positive bacteria, Gram negative bacteria and fungi[3,4].

In a newly formed series 2-substituted mercapto-quinazoline-4-one was synthesized and screened. In the present investigation the quinazoline analogue were designed to contain 2-ethyl-thio functional group, this thioether moiety believed to bind to an electron deficient carbon atom which identified as a possible pharmacophore of the antimicrobial activity.

The quinazoline ring (2) was reacted via thiol group with N-chloroacetyl aniline derivatives to afford the corresponding 2-mercapto-(arylamino carbonyl methyl)-3-ethyl-substituted quinazoline -4-one (3). Also the key compound (2) was reacted with p-Chlorobenzyl bromide and phencyl bromide to give 4, 5 respectively.

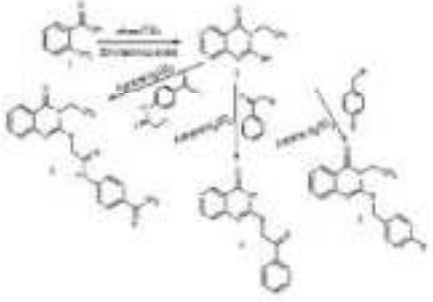
The newly synthesized compounds will be screened against Gram negative bacteria (*E.Coli*), Gram positive bacteria (*S.aureus*, *B-subtilis*) and antifungal (*S.Cervisiae*, *C.albicans*).

EXPERIMENTAL METHODS

Chemistry:

2-Thioxo-2-ethyl-3H-quinazolin-4-one (2) anthranilic acid (0.01mol) and ethyl isothiocyanate (0.012 mol) in ethanol (50mL) was heated under reflux for 4h. The reaction mixture was then cooled and solvent was evaporated under vacuum. The obtained solid was washed with petroleum ether (40:60), filtered dried and recrystallized from ethanol to give(2) in 65% yield, m.p 230-232,^{1}H-NMR,(DMSO-d_6)δ1.2(t,3H,CH_3CH_2-),3.24(q,2H,CH_2-CH_2-),1.5(S,1H,thiol),7.39-7.5(m,3H,qunazol inc),7.9(d,1H,quinazoline).

Scheme:



Compound 3: (yield 50%),m.p 167-169, benzene,1H,qunazoline), 8.2(S,1H,p-NHCO ^{1}H-NMR,(DMSO-d_6) δ 1.2(t,3H,CH_3-CH_2-), 2.33(S, 3H, CH_3-C=O), 3.24(q,2H, CH_2-CH_2-),3.81(S,2H,S-CH_2CO),7.4-7.51) (m,3H, quna zoline),7.84 (d,2H, disubstituted benzene), 7.75 (d,2H disubstituted benzene),7.9(disubstituted)-

Compound 4: yield of (60%), m.p 181-182, ^{1}H-NMR,(DMSO-d_6) δ 1.2(t,3H, CH_3-CH_2-),3.24(q, 2H, CH_2-CH_2-), 4.13(S, 2H, S-CH_2-CO),7.41-7.91(m,9H, qunazoline and aromatic ring).

Antimicrobial Activity:

Antibacterial studies: The newly synthesized compounds (3,4,5) will be screened against Gram negative bacteria [E.Coli],Gram positive bacteria (S.aureous, β-subtilis (recultured) bacterial strains by disc diffusion method[5,6]. Zones of inhibition were calculated and compared with the controls carefully.

Antifungal studies: All the compounds (3, 4, 5) will be screened for their antifungal activity using C. albicans and A. niger in DMSO solvent by agar diffusion technique[7,8]. Fungal zones of inhibition will be calculated and compared with the controls.

RESULTS AND DISCUSSION

Chemistry: All the compounds are well characterized by NMR and characteristics protons confirmed the desired compounds (4,5,6).

Antimicrobial activity: The series of desired compounds under study will be sent to the microbiological department for the antibacterial and antifungal activity against selected strains.

REFERENCES

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Substituted Quinazoline Derivatives: Synthesis,Spectral Characterization and Antimicrobial Agents

Salman Al-Askar, Dr Menshawy A. Mohumed

Department of Pharmaceutical Chemistry, College of Pharmacy, Salman binabdulaziz University, Al-Kharj, Saudi Arabia

INTRODUCTION

Quinazoline is a family of heterocyclic compounds which has shown broad variety of biological activities [1].

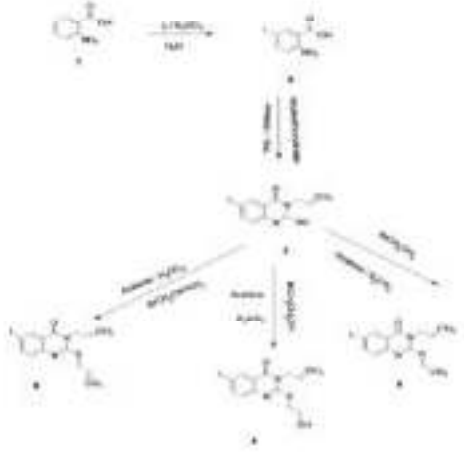
There is an urgent need for new class of antimicrobial agents to combat resistance related problems to microbes [2].

EXPERIMENTAL METHODS

Chemistry:

General method for Synthesis of compounds 4-6. A mixture of the 2-thion analog 3 (0.01 mol), allyl bromide or 2-bromoethanol and or ethyl bromide (0.012 mol) and anhydrous potassium carbonate (2gram) in acetone (50 m L) was heated under reflux for 12 hr. Solvent was evaporated in vacuo and the obtained residue was washed with dried and recrystallized from ethanol to give 3, 4, 5 respectively with 60, 65, 68% yield.

Scheme:



Compound 4:

^{1}H-NMR,[DMSO-d_6] :δ 2.0(S, 1H, OH), 3.06(t,2H,S-CH_2-CH_2-OH), 3.87 (d, 2H, NCH_2-CH=CH_2),4.20(t,2H,S-CH_2-CH_2-OH), 5.15-5.17 (t,2H, N-CH2-CH=CH2), 5.83(m,1H,N-CH_2-CH=CH_2), 7.2(dd, 1H, quinazoline)7.9(dd, 1H, qunazoline), 8.3 (d, 1H, qunazoline).

Compound 5:

^{1}H-NMR,[DMSO-d_6] : δ 1.31(t, 3H, S-CH_2-CH_3), 2.91(q,2H,S-CH_2-CH_3),3.87(d,2H,N-CH_2-CH=CH_2) 5.83(m,1H,N-CH_2-CH=CH_2),7.2(dd,1H,quinazoline) 8.3(d,1H,qulnazoline)

Compound 6:

^{1}H-NMR, (DMSO-d_6): δ 3.87 (d, 2H, N-CH_2-CH=CH_2), 3.54(d, 2H, S-CH_2-CH=CH_2), 5.03-5.15 (m,4H, N-CH_2-CH=CH_2, S-CH_2-CH=CH2), 5.83-5.96(m, 2H, N-CH2-CH=CH2), 7.4(dd, 1H, quinazoline)8.1(dd, 1H, qunazoline), 8.5 (d, 1H, qunazoline).

Antimicrobial Activity:

Antibacterial studies: The newly synthesized compounds (4,5,6) will be screened against Gram negative bacteria (E.Coli), Gram positive bacteria (S.aureous, β-subtilis (recultured) bacterial strains by disc diffusion method[3-6]. Zones of inhibition were calculated and compared with the controls carefully.

Antifungal studies: All the compounds (4, 5, 6) will be screened for their antifungal activity using C. albicans and A. niger in DMSO solvent by agar diffusion technique[7-9]. Fungal zones of inhibition will be calculated and compared with the controls.

RESULTS AND DISCUSSION

Chemistry: All the compounds are well characterized by NMR and characteristics protons confirmed the desired compounds (4, 5, and 6).

Antimicrobial activity: The series of desired compounds under study will be sent to the microbiological department for the antibacterial and antifungal activity against selected strains.

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Department of Pharmacology

The potential protective effect of Myrrh on acetic acid-induced colitis in rats

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INTRODUCTION

Ulcerative colitis (UC) is a chronic gastro-intestinal disorder characterized by intestinal inflammation and mucosal tissue damage. The cause of UC is still unknown, but several factors have been implicated. These include environmental factors, genetic factors, microbial pathogens, altered levels of inflammatory mediator and defects in immunoregulation. Medications currently available for UC alleviate inflammation and reduce symptoms, but do not provide a cure or prevent long-term complications. The principal drugs used are 5-aminosalicylate, corticosteroids and immunosuppressants. Although these drugs have shown their benefit in the treatment of UC, they have serious side effects that limit their clinical application. Myrrh (Commiphora molmol, family Burseraceae) is a well-known herb that is widely used as a home remedy in Saudi Arabia. It is an oleo-gum resin that consists of water-soluble gum, alcohol-soluble resins and volatile oils. A variety of toxicity studies have shown that Myrrh is essentially nontoxic. Myrrh has been widely used as an anti-inflammatory and wound healing commercial product. Apparently, because of its antimicrobial activity, Myrrh has historically been used, alone and in combination with other herbal products, to treat infections and inflammations. We hypothesized that Myrrh, due to its anti-inflammatory and anti-oxidative activity, may affect inflammatory diseases, such as colitis.

MATERIALS & METHODS

Thirty Wister albino rats were divided into 5 equal groups: Groups 1and 2 (normal and colitis control groups, respectively) were given the vehicle in a dose of 5 mL/kg. Group 3 (reference group) was given dexamethasone (DEX) in a dose of 0.2 mg/kg. Groups 4 and 5 were administered 400 mg/kg of the aqueous and methanolic extracts of Myrrh, respectively. All medications were administered orally via the aid of an orogastric cannula, once daily for 7 consecutive days and the last dose was administered 2 h before colitis induction.

Induction of Ulcerative Colitis

Rats were lightly anesthetized with ether and a polyethylene catheter was inserted into the rectum such that the tip was 8 cm inside the anus. Colitis was induced (except the normal control group) by intracolonic application of 1 mL of 5% acetic acid (in 0.9% NaCl). Two days after the induction of colitis, rats were euthanized and the distal 8 cm of the colon was resected for evaluation of different parameters.

Macroscopic assessment of colitis

After resection of the distal colon, the specimen was flushed out with cold saline solution, opened longitudinally. The colon specimen of each rat was weighted and wet weight/length ratio was calculated (g/cm). Macroscopic damage was assessed by the scoring system of Amirshahrokhi as follows: 0 = no inflammation; 1 = swelling or redness without ulcers; 2 = swelling and redness; 3= one or two ulcers; 4= more than two ulcers or one large ulcer; 5= mild necrosis; 6= severe necrosis. Ulcer area was measured for each specimen using a 1-mm2 grid. Ulcer index was measured by summing the lesion score and the ulcer area for each colon specimen.

Microscopic assessment of colitis

The colon samples were fixed in 10% formalin for 1 week and the samples were then dehydrated in graded ethanol and embedded in paraffin. Sections of 7 µm were deparaffinized with xylene, stained with hematoxylin–eosin (H&E) and examined microscopically.

RESULTS & DISCUSSION

Macroscopic assessment of colitis

In the present investigation, no abnormal changes were observed in rats of the normal control group

suggesting that handling procedure had no interference with the experimental outputs (Table 1).

Table 1: Effects of DEX and Myrrh extracts on the macroscopic parameters of ulcerative colitis induced by acetic acid in rats. (n = 6).

Groups	Dose (mg/kg)	Lesion score (0-6)	Ulcer area (cm2)	Ulcer index	Wet W/L ratio (g/cm)
Normal control	0.0	0.00±0.00	0.0±0.00	0.00±0.00	0.29±0.03
Colitis control	0.0	5.62±0.11	3.0±0.08	8.62±0.19	0.94±0.03
DEX	0.2	1.61±0.04*	0.4±0.02*	2.01±0.07*	0.33±0.01*
Aqueous extract	400	3.24±0.09*	0.9±0.04*	4.14±0.12*	0.58±0.03*
Methanol extract	400	2.27±0.10*	0.6±0.03*	2.87±0.06*	0.45±0.01*

Indicate significance compared to colitis control group ($p < 0.05$)

Two days after intracolonic administration of 1 mL of 5% acetic acid to colitis control rats there was a macroscopic evidence of extensive colonic mucosal injury. The mucosa appeared macroscopically ulcerated, hemorrhagic, oedematous and necrotic compared to normal control group. There was a significant protection from ulceration and necrosis in the group which had received the aqueous extract of Myrrh compared to colitis control group.

Macroscopic evaluation of the distal colon after pretreatment with the methanolic extract revealed significant protection against ulceration and necrosis, but in comparison to aqueous extract group, we noticed that the methanolic extract has superior effect in protection against inflammation and colon injury than the aqueous extract group. Although the exact mechanism by which Myrrh protect against colitis has not been fully elucidated, several reasons may anticipate the anti-ulcerogenic activity, one being is its anti-inflammatory effect. Another possible mechanism is that Myrrh could protect mucus production in the colon. In a similar study, Bone mentioned that the protective effect of Myrrh on gastric ulcer was attributed to its effect on mucus production. Moreover, the protective effect of Myrrh against acetic acid induced ulcers could be attributed to the anti-oxidant effect of its polyphenolics content.

CONCLUSION

The methanolic extract of Myrrh has superior effect in attenuating inflammation and colonic damage-induced by acetic acid then the aqueous extract. This result suggests that the methanolic extract of Myrrh may be effective in the prevention of UC through its anti-inflammatory effect. However, more detailed phytochemical studies are necessary to identify the active principles and exact mechanism of action.

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Estimating pH of Drinking Water from Different Sources

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INTRODUCTION

In chemistry, pH is a measure of the acidity or basicity of an aqueous solution. Solutions with a pH less than 7 are said to be acidic and solutions with a pH greater than 7 are basic or alkaline. Pure water has a pH very close to 7.

pH measurements are important in medicine, biology, chemistry, agriculture, food science, environmental science, oceanography, chemical engineering, nutrition, water treatment & water purification, and many other applications.

Mathematically, pH is the negative logarithm of the activity of the (solvated) hydronium ion, more often expressed as the measure of the hydronium ion concentration.

The pH of water is a measure of the acid–base equilibrium and, in most natural waters, is controlled by the carbon dioxide–bicarbonate–carbonate equilibrium system. An increased carbon dioxide concentration will therefore lower pH, whereas a decrease will cause it to rise.Temperature will also affect the equilibria and the pH. In pure water, a decrease in pH of about 0.45 occurs as the temperature is raised by 25 °C. In water with a buffering capacity imparted by bicarbonate, carbonate, and hydroxyl ions, this temperature effect is modified. The pH of most raw water lies within the range 6.50–8.00.

- *History:*

In a publication of 1909, the Danish scientist Soren P.L. Sörenson discussed the inadequacy of measuring acidity by the total amount (normality) of acid additions to a particular solution. The added amount of acid would not necessarily be a true measure of its dissociation, depending on chemical interactions with other chemical species. Sörenson proposed that the actual degree of acidity should be rationally measured by hydrogen ion concentration and proposed the pH scale for expressing the hydrogen ion concentration as detailed in the quote below:

"I will explain here that I use the name "hydrogen ion exponent" and the designation PH for the numerical value of the exponents of this power. "

- *Importance of pH:*

The pH of water determines the solubility (amount that can be dissolved in the water) and biological availability (amount that can be utilized by aquatic life) of chemical constituents such as nutrients (phosphorus, nitrogen, and carbon) and heavy metals (lead, copper, cadmium, etc.).

- *The goal of Research:*

To determine pH in drinking water available in market to see the committeant of companies to what written on bottle and the possibility of changing pH in bad storage conditions which could be due to bad plastic quality.

The material used in this research is:

pH meter, pH electrode, pH 7.00 buffer, pH 4.00 buffer, pH 10.00 buffer, Watch glasses and 50 samples of drinking water from 10 different companies in marketing , 5 of each company (5 out of them made of glass)

- *The method I used:*

- Calibration Buffer Preparation

1. Pour about 30 mL of pH 10.00, pH 7.00 and pH 4.00 (in separate 50 ml beakers and covert for further using .

2. Use those beakers to calibrate pH meter.

- Notes: That all of the buffers to reach the same temperature, since pH readings are temperature dependant.

- Sample Preparation

1. Collect and prepare the samples according owr sample requirements and procedures.

2. Pour about 30 mL of the sample into a 50 mL beaker, label the beaker and cover the beaker with a watch glass to sample measurements. Repeat this step for all of the samples.

- Electrode Preparation

Prepare the electrode according to the instructions in the electrode user guide or instruction manual. Prior to

calibration, store the electrode in pH electrode storage solution.

Statistical Analysis: All data obtained were expressed as the mean ± standard error of mean (SEM). Statistical differences between the treatments and the controls were estimated by the student's t-test. P values less than 0.05 was considered to be statistically significant.

RESULTS

Table:

Group	PH in manufactory	PH of Water in good storage (5 samples)	PH of Water in bad storage (5 samples)
1 Nestle "Plastic"	7.28	7.25 ±0.03	7.29 ±0.09
2 Safa "Plastic"	7.28	7.43 ±0.08	7.66 ±0.08
3 Aquafina "Plastic"	7.28	6.85 ±0.23	7.26 ±0.08
4 Hayat "Plastic"	7.28	7.08 ±0.40	7.24 ±0.03
5 Mineral "Plastic"	6.80 - 7.20	7.23 ±0.03	7.36 ±0.08
6 Oasis "Plastic"	6.80 - 7.20	7.54 ±0.02	7.43 ±0.40
7 Masa "Plastic"	7.28	7.63 ±0.02	7.22 ±0.08
8 Arwa "Plastic"	6.88	7.21 ±0.22	7.06 ±0.02
9 Aqua "Plastic"	7.28	7.42 ±0.02	7.35 ±0.09
10 Oxygizer "Glass"	7.28	7.66 ±0.26	7.65 ±0.07

CONCLUSION

Some companies committed good pH while purifying water, but pH changed after bad storage, which may reflect the bad quality of plastic used, on the other side other companies (Nestle, Manaa and Dafa), the samples shown good committee, and the value of pH did not change, which reflects good plastic used, While some other companies did not committee good result of pH, while quality of plastic used was good (Faytha and Moya). Finally, glass is the best to store drinking water (Oxygizer).

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Effects of Energy Drink in Wistar Rats: A Safety Evaluation Study

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INTRODUCTION

Global consumption of energy drinks (EDs) is exponentially growing due to their stimulating effect on the central nervous system and body and the purpose of enhancing both mental and physical performances. EDs are highly caffeinated and sometimes having herbal supplements, vitamins and taurine [1, 2]. For example, one single can of Red Bull, 250mL (one of the most consumed brand of EDs) contains 80 mg of caffeine (or 0.32mg/mL) and 1000mg of taurine (or 4mg/mL) as major components.

In many acute clinical human trials, some over-the-counter energy drinks have shown a positive stimulation of resting energy expenditure (REE) [3, 4]. With an increase in energy expenditure at rest, more energy is being expended as long as the chemicals are within the system. A greater amount of calories being expended at rest translates into weight loss over a period. Furthermore, several research studies have demonstrated that short term thermogenic drink (TD) ingestion does not result in adverse health effects, making it safe for healthy individuals [5,6].

On the third of March 2014, the Council of Ministers Kingdom of Saudi Arabia banned the sale of energy drinks at government, educational and health facilities and advertising energy drinks on social, cultural and sports events. According to Food and Beverage Committee estimates 5 million young men consume more than 5 million energy drink cans daily, worth SR15 million [7]. Studies on the safety of energy drinks have been inconsistent. It has been reported that long-term exposure to the various components of energy drinks may result in significant alterations in the cardiovascular system [8]. Though research is yet to be conclusive on the safety or otherwise of energy drink consumption, Council of Ministers Kingdom of Saudi Arabia recently expressed concerns about the safety and efficacy of the use of energy drinks. The present study is therefore aimed at investigating the effects of energy drink in normal albino rats.

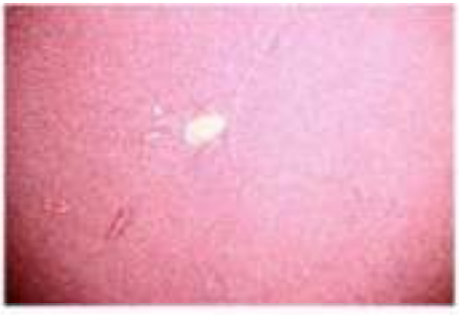

Fig: 1 Control liver 100X

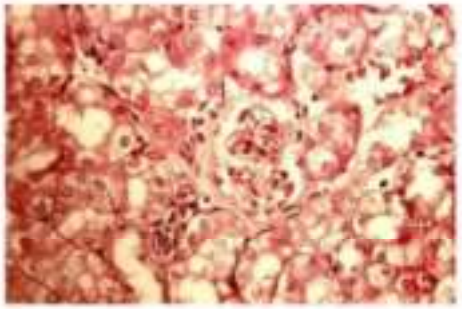

Fig: 2 Control Kidney 400x

Fig: 3 Control Heart 100x

Fig: 4 ED treated liver 100X

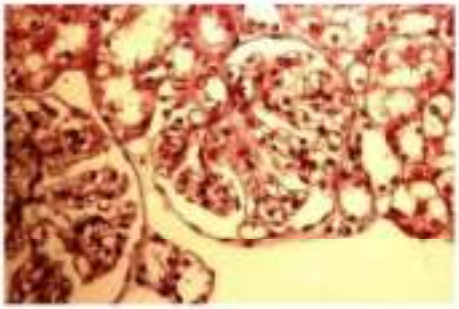

Fig: 5 ED treated Kidney 400x

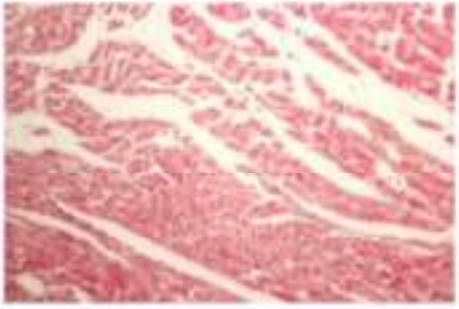

Fig: 6 ED treated Heart 100x

MATERIALS & METHODS

Animals: Wistar albino rats approximately of the same age (8-10 weeks), weighing 200-220 g were used. Animals were kept at constant temperature (22±3°C), humidity (55%) and light-dark conditions (12/12 h light/dark ratio). Animals were fed on a standard animal chow diet and drinking water ad libitum.

Treatment schedule

Ten Wistar rats weighing 200-220g were assigned into two groups of five rats per group. Group 1 rats were given ED, group 2 rats were given normal drinking water and served as controls. The treatment lasted for 21 days, after which the animals were sacrificed and their blood and organs were collected for biochemical and histological studies.

Body weight and organ weight: Body weights of rats of each was recorded at twice weekly intervals and final body weights were recorded after 24 h following last dosing for each group. Animals were sacrifice under ether anesthesia and organs (liver, heart and kidney) were dissect out, cleared free of fat and connective tissues by washing in ice cold physiological saline (0.9%) and weighed on electronic balance. The organ body weight index (OBWI) was calculated as (organ weight/body weight) × 100.

Determination of serum toxicity markers weres done with the kits.

Histological evaluation: Tissues will be fixed in freshly prepared 10% formalin solution and processed for paraffin sections. Sections will be cut at 5µm with a rotary microtome. Sections will be stained with haematoxylin and eosin for histological evaluation.

Statistical analysis: All data will be expressed as mean ± SEM and statistical analysis will be done using one way ANOVA test. Significance between control group and treated groups will be performed using Dunnett's -'t' test.

RESULTS

Table 1. Effect of oral administration of the Energy drink for 21 days on the serum toxicity markers:

Groups	ALT (U/L)	AST (U/L)	Urea (mg/dL)	Creatinine (mg/dL)
Control	54.6±6.60	146.1±8.4	33.36±3.33	0.34±0.05
Energy Drink	257±8.7	655.9±17.9	37.33±4.5	0.45±0.04

Table 2: Effect of oral administration of the Energy drink for 21 days on Organ to body weight ratios

Treatment	Body weight	Organ to Body Weight Ratios (g/100g)		
		Heart	Liver	Kidney
Control	224.5±8.25	0.76±0.05	3.60±0.70	0.58±0.02
Energy Drink	215.8±5.25	0.72±0.08	3.58±0.85	0.52±0.05

RESULTS & DISCUSSION

Table 1 shows the effects of the administration of the caffeinated energy drinks on the serum AST, ALT, Urea and Creatinine. The results show that, energy drink consumption significantly increased the AST, ALT, Urea and Creatinine levels when compared with the control group.

Table 2 shows the effects of the administration of the caffeinated energy drinks on the Organ to body weight ratios. The results show that, energy drink consumption significantly decreased body weight and Organ to body weight ratios when compared with the control group.

Histological sections of liver, kidney and heart tissues showed well preserved respective tissue architecture. The liver of energy drink treated rat showed vacuolar degeneration of some hepatocytes (empty foci devoid of liver tissue) as well as focal hepatic hemorrhage, kupffer cell activation and dilatation of hepatic sinusoids (Fig. 1 and 2).

The histopathological study of the kidneys of the rats in the test and control groups appeared normal with no irregularities or abnormalities (Fig. 3 and 4).

Histological examination of the heart, shows no significant change in the diameters of masts. Interstitial fibrosis and disarrangement of myocytes were slightly increased in the 21 days energy drink treatment (Fig. 5 and 6).

CONCLUSION

It may be concluded that consumption of energy drink is associated with significant alterations in serum toxicity markers, bodyweight, organ body weight index; and histopathological finding also shows considerable histological changes. In view of our finding the energy drink should be consumed with caution. Public health education is urgently needed to educate individuals; especially youths about the risks of consuming highly caffeinated energy drinks.

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***Arabian Myrrh Resin* : Its Anti-Inflammatory and analgesic Potential**

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Abstract

AIM OF THE STUDY: This present study was carried out to evaluate the anti-inflammatory, analgesic effects and safety on gastric mucosa of Arabian myrrh resin (Commiphora myrrha). Moreover, its chemical constituents were analysed and identified by GC-MS.

MATERIALS AND METHODS: The anti-inflammatory activity was investigated by utilizing carrageenan induced paw edema method in rats and analgesic activity by hot plate analgesiometer. The effect of the administration of indomethacin was also studied for reference. Gastric irritation was also studied by using the Ulcer score index compared to indomethacin. The components of Arabian myrrh resin were analysed by the Gas chromatography (GC-MS).

RESULTS: It was found that the Arabian myrrh resin significantly inhibited the carrageenan-induced rat paw edema as well as increased the latency time in hot plate analgesiometer and has no gastric irritation.

CONCLUSION: Results of our study corroborate the folkloric use of the Arabian myrrh resin as anti-inflammatory and analgesic and contribute significantly to the pharmacological validation for the safe use of Arabian myrrh resin.

Study Objective and Design

In the present study, we investigated: Anti-inflammatory effect, Analgesic and safety on gastric mucosa of Arabian Myrrh Resin, Moreover its chemical analysis was also done by GC-MS.

1. Anti-inflammatory activity: by carrageenan induced rat paw edema method along with its safety study on gastric mucosa of rats (ulcer index).

2. Analgesic activity: by hot plate analgesiometer.

3. Phytochemical investigation: by GC-MS (Gass_chromatography-Mass) analysis.

METHODOLOGY

Materials: Arabian myrrh resin mucilage (AMRM): 1 g of resin in 4ml of distilled water

Anti-inflammatory activity

- ❖ Carrageenan-induced rat paw edema
- Inflammation was induced by administering 0.1 ml of (1%) carrageenan into sub-plantar surface of rat hind paw (Winter et al., 1962). The animals were divided in to three groups (n=6 each) viz.;

Group I: Carrageenan control (normal saline 10 ml/kg, p.o.);

Group II: Arabian myrrh resin mucilage (AMRM) (500 mg/kg, p.o.)

Group III: Indomethacin (10 mg/kg p.o)

- In this method, all drugs were given orally. One hour later all animals were injected with 0.1 ml of 1% Carrageenan solution in the sub-plantar surface of left hind paw and the paw volume was measured using digital plethysmometer (Ugo basile) at 0hr, 1 hr, 2 hr and 3 hr.

- ❖ Hot plate analgesiometer
- Swiss albion mice were divided into two groups and latency time using hot plate analgesiometer was evaluated before and after (15 min, 30 min, 60 min and 120 min) of drug administration.

Group I: Normal control (normal saline 10 ml/kg, p.o.);

Group II: Arabian myrrh resin mucilage (AMRM) (500 mg/kg, p.o.)

- ❖ Safety of drugs on gastric mucosa of rats (ulcer index)
- In this method, the animals were divided into two groups (n=6 each) viz.;

Group I: Arabian Myrrh extracts (1000 mg/kg, p.o.)

Group II:Indomethacin (20 mg/kg p.o.)

After 4 hours of administration animals were sacrificed under ether anesthesia. Then the stomachs were removed and opened the greater curvature and evaluated for ulcer index score (Main and Whittle, 1975)

Phytochemical investigation:

Using Gas chromatography-Mass (GC-Mass) analysis

Results

Table 1: Effect of Arabian myrrh resin mucilage (AMRM) and Indomethacin on carrageenan-induced rat paw edema

Groups	Dose mg/kg	Paw volume increase			Inhibition %		
		1hr	2hr	3hr	1hr	2hr	3hr
Control	-				-	-	-
AMRM	500						
Indomethacin	10						

*All values are expressed as Mean ± SEM. (n=6 in each group). The data was analyzed by ANOVA followed by Dunett's t-test. *P < 0.05, **P < 0.01, ***P < 0.001*

Fig 1: Effect of Arabian myrrh resin mucilage (AMRM) and Indomethacin on latency time using hot-plate analgesiometer

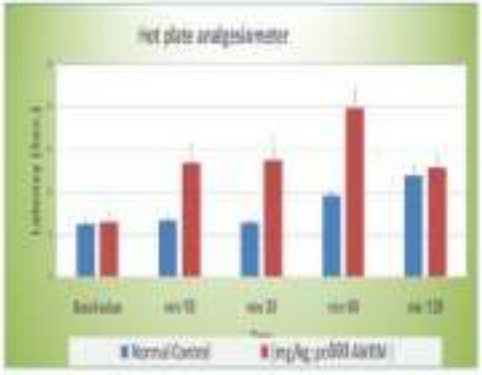
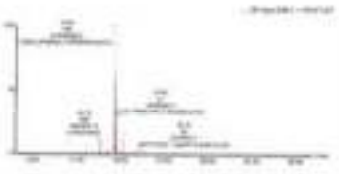


Table 2: Effect of the Arabian myrrh resin mucilage (AMRM) and Indomethacin on Ulcer Index Score

Groups	Dose mg/kg	Ulcer Index Score
AMRM	500	
Indomethacin	10	

Phytochemical investigation

A significant amount of 27 organic compounds was estimated using GC/MS technique.



Results indicate significant amount of the important organic constituents identified in the Arabian myrrh resin include limonene, curzerene, germacrene B, isocericerine, myrcenol, beta selinene, spathulenol etc.

DISCUSSION & CONCLUSION

Since ancient times, in various cultures worldwide, inflammatory disorders and related diseases have been treated with plants or plant-derived formulations (Krishnaswamy, 2008; Marc et al, 2008).

Using the carrageenan-induced paw oedema, which is the most widely used primary test for the screening of new anti-inflammatory agents. The early phase (1–2 h) of this assay is mainly mediated by histamine, serotonin and an increasing synthesis of prostaglandins in the damaged tissue surroundings. The late phase is sustained by prostaglandin release (Britto and Antonio, 1998). The obtained results indicated that Arabian myrrh resin inhibited significantly the formation of the carrageenan-induced rat paw edema, measured in the first and second hours of experiment. Moreover, AMRR

showed analgesic properties as indicated by hot plate analgesiometer results.

Phytochemical analyses of the Arabian myrrh resin indicated that the large majority of its constituents were sesquiterpenoid, which are known to possess varied biological activities including immunomodulation, inhibition of mast cell degranulation along with the inhibition of IL-4 release, IL-4 mRNA expression and IL-4 protein expression (Kim et al., 2013). These mechanisms may contribute at least in part to the anti-inflammatory and analgesic action of Arabian myrrh resin, as it shows significantly more activity in the early phase of carrageenan-induced rat paw edema assay.

It is important to point out that Arabian Myrrh resin did not showed any gastric irritation signs. Therefore, the combination of the anti-inflammatory with no gastric irritation should be taken into account, because of the serious limitations of a large number of anti-inflammatory agents, that produce gastric irritation, bleeding and mucosal cellular damage.

Considering that there are only a few preliminary data reported in the literature regarding the anti-inflammatory and analgesic properties of Arabian Myrrh resin, and that it has been largely used in folk medicine to treat inflammatory disorders, the obtained results corroborate the folkloric use this plant. In addition, considering that this oleo-gum-resin display no gastric irritation, Arabian Myrrh resin would be a good candidate for further development of a new phytotherapeutical medicine.

Also, the obtained results in this work contribute significantly to the pharmacological validation for the safe use of Arabian Myrrh resin.

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Evaluation of Diuretic Activity of Methanolic Extracts of Rhazya stricta, Brassica nigra and Sinapis alba in mice

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INTRODUCTION

Diuretics are the drugs that increase the rate of urine flow, sodium excretion and are used to adjust the volume and composition of body fluids in a variety of clinical situations such as congestive heart failure, nephritic syndrome, cirrhosis, renal failure, hypertension, and pregnancy toxaemia (Aguwu et al., 2005). Most diuretic drugs have the adverse effect on

quality of life including impotence, fatigue and weakness. Naturally occurring diuretics include caffeine in coffee, tea, and cola, which inhibit Na+ reabsorption and alcohol in beer, wine and mixed drinks, which inhibit secretion of ADH (Agus and Goldberg, 1971; Stookey, 1999). Herbal medicines derived from the plant extracts are being increasingly utilized to treat a wide variety of clinical diseases, though relatively little knowledge about their mode of action is available.

HARMEL (Rhazya stricta, Apocyanacae), grows in Arabia, Syria, North Africa, Iran and southern Europe. Today it is well known in central and northern Arabia and Iraq but rare in the eastern part of the Arabian Peninsula. Harmel has a long history of uses in traditional Arabian medicine. Al-Kindi used the leaves, seeds and juice in various prescriptions, including remedies for insanity and epilepsy, baldness and hemorrhoids. Harmel seeds are today used as an alterative and purifying medicine, and as an aphrodisiac.

MUSTARD: *Sinapis alba* L. (white or yellow mustard), *Brassica nigra* L. (black or true mustard), Family: Brassicaceae. Derivatives of the mustard constituent allyl isothiocyanate form the basis for toxic agents such as mustard gases and antineoplastic drugs (eg, bendamustine). Mustard is used as a food flavoring, for forage, as an emetic, and diuretic, as well as a topical treatment for inflammatory conditions such as arthritis and rheumatism. Mustard also has potential pharmacological effects in cardiovascular disease, cancer, and diabetes; however, there are limited clinical trials to support its use for any indication.

A bibliographic survey showed that there are no systematic studies have been reported for diuretic activities of Rhazya stricta (الحرمل), Brassica nigra (خردل الأسود) and Sinapis alba (خردل الأصفر). Therefore, the present study was undertaken to investigate diuretic activity of the extract of harmel, black and yellow mustard seeds by measuring urine volume in mice.

MATERIALS & METHODS

Plant material: The harmel leaves, black and yellow mustard seeds were purchased from local market in Al-Kharj, Saudi Arabia, and authenticated by expert taxonomist.

Preparation of the extract: For the preparation of extract, air dried harmel leaves, black and yellow mustard seeds were powdered and packed into Soxlet's apparatus and successively extracted with methanol at room temperature for 7 days. The extract was evaporated to dryness in rotary evaporator.

Animals: Swiss albino mice (body weight = 20-25 gm) of both sexes were procured from the animal house facility of College of Pharmacy, Salman Bin Abdulaziz University, KSA. The animals were kept in standard environmental conditions for at least one week for acclimatization and had free access to food and drinking water.

Diuretic activity: Prior to the start of the experiment, the mice were fasted overnight with free access to water. Then, the mice were randomly allocated in individual metabolic cage and divided into four groups consisting of six mice in each group. The first group of animals was served as normal control group, and received vehicles only, while the second, third and fourth groups were treated with methanolic extract of harmel (4 g/kg, p.o.), black mustard (150 mg/kg) and yellow mustard (5 mg/kg) respectively. The volume of urine excreted was measured at the end of 24 hr.

Measurement of urine pH, Na+, K+ and Cl-: The samples were diluted (1:5 in deionized water) and urine pH was measured with a digital pH meter of fresh urine sample. The total concentrations of sodium, potassium, calcium and other electrolytes were estimated in urine (Beckette and Stenlake, 1997; Jeffery et al., 1989).

Statistical Analysis: All data obtained were expressed as the mean ± standard error of mean (SEM). Statistical differences between the treatments and the controls were estimated by the student's t-test. P values less than 0.05 was considered to be statistically significant.

RESULTS

Table 1: **Effect of methanolic extract of plants on urine volume and PH**

Group	Treatment	Dose	Urine volume (ml)	pH
I	Normal Saline	2 ml/kg	2.2	6.0
II	*Rhazya stricta*	4 g/kg	3.0	6.0
III	*Brassica nigra*	150 mg/kg	3.2	6.0
IV	*Sinapis alba*	5 mg/kg	3.5	6.0

Table 2: Effect of methanolic extract of plants on electrolytes excretion in urine

Group	Treatment	Dose	Sodium (mmol/l)	Potassium (mmol/l)	Chloride (mmol/l)	Calcium (mmol/l)
I	Normal saline	2 ml/kg	96.93	123.72	280.40	4.28
II	*Rhazya stricta*	4g/kg	123.28	130.58	285.60	15.60
III	*Brassica nigra*	150 mg/kg	115.20	280.50	293.00	10.00
IV	*Sinapis alba*	5 mg/kg	100.00	133.60	292.60	14.90

RESULTS & DISCUSSION

The results of the evaluations carried out on the extracts are listed in Tables 1 and 2. Table 1, shows the urinary volume, while Table 2 shows the excretion of electrolytes (electrolytes content) in urine obtained from the rats of different treated groups.

Urine volume: Table 1 showed that, urine volume was significantly found to be increased in all drug treated group and the maximum effect was found with *Sinapis alba*.

Electrolyte excretion: Methanolic extracts of harmel and mustard seeds produced significant increase in electrolytes concentrations when compared to normal control group. *Rhazya stricta* found to be have good effect on sodium excretion (123.28), while potassium (190.50) and chloride (293.00) ion excretion was found to be maximum in *Brassica nigra* treated group.

According to previous literature survey, the leaves and seeds of plants, widely used for the treatment of hypertension and renal disease, but to the best of our knowledge, no previous pharmacological or clinical study has been done to test the diuretic activity of these plants. In the present study, methanolic extract of plants showed significant increase in urine volume and electrolyte excretion. Thus, the diuretic effect of extract indicated by increase in both water and sodium ion excretion, which proved its strong diuretic activity, but active constituents responsible for the diuretic activity cannot be concluded on the basis of the present study. The preliminary phytochemical investigation revealed the presence of phytosterol and alkaloids in methanolic extract which can be responsible for diuretic activity but need to confirm by further study.

CONCLUSION

Methanolic extract of plants have significant effect on urine volume and excretion of Na^+ and other electrolytes in urine output, thus, the results obtained in the present study provides a quantitative basis to explain the traditional folkloric use of plants as a diuretic agent.

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The Potential Hyperglycemic Activity of Lepidium Sativum L In Albino Rats

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INTRODUCTION

Diabetes mellitus (DM) is a complex metabolic disorder that is increasing tremendously all over the world. King et al., 1998 reported that, DM is expected to increase to more than 300 million by the year 2025. Garden cress, Lepidium sativum, (LS) locally known as 'hab arachad' belonging to the family Brassicaceae where LS is largely recommended by traditional herbal healers as phytotherapy for hypertension, diabetes control, renal disease (Eddouks et al., 2002). The seeds are consumed in salad and as spice (Maier et al., 1998).

The seeds contain volatile essential aromatic oils, active principle components, carbohydrate, protein, fatty acid, Vitamin: β-carotene, riboflavin, niacin, ascorbic acid, flavonoids, and isothiocynates glycoside (Yogesh et al., 2011).

Previous studies have been demonstrated the protective action of LS against carcinogenic compounds and growth inhibition of pseudomonas aeruginosa, a becteria strain with a potent antibiotic resistance..

As far as the hypoglycemic activity of LS is concerned, it was previously demonstrated that the aqueous LS extract exhibited a hypoglycemic activity in diabetic rats. However, the mechanism underlying this pharmacological effect is still to be determined (Eddouks & Maghrani 2008).

Objective

Many herbal medicines have been recommended for the treatment of diabetes. The purpose of this study was to determine the mechanism underlying the hypoglycemic activity of the aqueous extract perfusion of Lepidium sativum L. (LS), in streptozotocin-induced diabetic rats.

MATERIALS & METHODS

Plant material: Lepidium sativum L seeds were purchased from local market in Al-Kharj, Saudi Arabia, and authenticated by expert taxonomist.

Preparation of the extract: For the preparation of extract, Lepidium sativum L seeds, were powdered and packed into Soxhlet's apparatus and successively extracted with methanol at room temperature for 7 days. The extract was evaporated to dryness in rotary evaporator.

Animals: Adult albino rats (180-200 g) of both sexes were procured from the animal house facility of College of Pharmacy, Salman Bin Abdulaziz University, KSA. The animals were kept in standard environmental conditions for at least one week for acclimatization and had free access to food and drinking water.

Hypoglycemic activity:

Induction of diabetes: After the adaptation period, the diabetes disease was induced by Streptozotocin (STZ). The animals were fasted overnight and diabetes was induced by a single intra peritoneal injection of a freshly prepared solution of STZ (50 mg/kg bw) in 0.1 M citrate buffer (pH 4.5). (Lutz and Pardridge, 1993). Negative control rats group were injected with citrate buffer alone. On the third day of STZ injection, the rats were fasted for 6 h and blood was taken by sinocular puncture. Rats with moderate diabetes having hyperglycemia (that is, with blood glucose of 250–400 mg/dl) were taken for the experiment. The rats were kept for 15 days to stabilize the diabetic condition (Jyoti et al., 2002).

The experimental design:

The rats were weighed and randomly divided into 4 groups each of 6 rats and fed on the basal diet. The first group which kept as normal named negative controls (N. control) and fed on standard diet only. Rats from group 2 to group 4 were used as diabetic rats fed on basal diet. Group two (G2) served as an untreated, positive control (P. control). The rest of rats were

classified into 2 groups administrated with different concentrations of LS by stomach tube. Rats of G3, were orally administrated with 50 mg LS/kg BW, and rats of G4 were orally administrated with 25 mg LS / Kg BW.

Biochemical parameters assays:

At the end of the experimental period, rats were weighed, killed by diethyl ether and their organs were weighed. Blood samples were collected from the animal's eye plexuses. Each sample was collected into a free coagulation dry clean centrifuge glass tube to prepare serum. Blood samples were left for 15 min. at room temperature, then the tubes were centrifuged for 15 min. at 3000 rpm and the clean supernatant serum samples were kept frozen at -20 ºC until analysis. Serum glucose and insulin were determined according to (Trinder, 1969 and Temple et al., 1992).

RESULTS & DISCUSSION

Table (1): The effect of administration LS, extracts for 30 days on the percentage of gain body weight in STZ-diabetic rat

Group	Daily Intake (mg/kg BW)	Gain Weight (%)
I	N. Control	25.19 ± 1.54^{a}
II	P. Control	12.73 ± 0.39^{c}
III	50 mg LS extract	23.21 ± 0.46^{b}
IV	25 mg LS extract	26.21 ± 0.38^{a}

*each value represents the Mean ± SE

The mean values with different superscript alphabetical indicate significant differences (P≤0.05) using LSD test

Table 2: The effect of administration LS extracts for 30 days in serum glucose and insulin in STZ-diabetic rat

Group	Daily Intake (mg/kg BW)	Serum glucose (mg/dl)
I	N. Control	115.24 ± 4.43^{c}
II	P. Control	258.41 ± 7.87^{a}
III	50 mg LS extract	118.05 ± 4.86^{c}
IV	25 mg LS extract	120.89 ± 5.36^{c}

The main objective of the present study is to shed more light on the specific action mechanisms of plants widely used in folk medicine to treat hyperglycemia namely, Hab Rashad or Garden cress (Lepidium sativum) which give highest impact on control blood glucose level and to become having the ability of therapeutic options for treatment of DM.

The results revealed that a reduction in weight gain percentage was observed in P. control (G2), which agree with Kumar et al., (2005) and Anand et al.,(2010), who found a decreased body weight of diabetic rats after treatment with streptozotocin (STZ). Ravi et al., (2004) observed that decreased body weight in diabetic rats is due to excessive breakdown of tissue proteins. Moreover, Jeong et al.,(2010) found that STZ treatment caused a significant reduction in the body weight gain of rats and a significant increase in the organ-to-body weight ratio for liver, kidney and pancreas. From the results of the present work, the administration of aqueous extract of LS to diabetic rats reversed the weight loss. This ability to recover body weight loss seems to be due to its antihyperglycemic effect.

CONCLUSION

The present study may be concluded that, the plant under investigation should be considered as an excellent candidate for future studies on DM. The aqueous LS extract exhibits a hypoglycemic activity in diabetic rat

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Department of Pharmacognosy

Pharmacognostical, Phytochemical and Physicochemical standardization of Athel (Tamarix aphylla) and sidr (Ziziphus nummularia) leaves

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INTRODUCTION

Tamarix aphylla or related plant species (F. Tamaricaceae) (Quranic name = Athil), mention in the Quran, Ahadith and Islamic literature for the folk medicinal use as jaundice, bad evils, rheumatism, wound and abscesses, treatment of camel skin diseases, cure mycotic or allergic dermatitis.

Ziziphus nummularia or sedar family Rhamnaceae is one of five species belonging to the genus Ziziphus which are native of Saudi Arabia. Related plant in Sura Saba (4 time), it is mentioned as an earth tree while in other suras it is mentioned as a Paradise tree. The traditional used of this plant including loss of appetite, chronic fatigue, diarrhea, pharyngitis, bronchitis, burns, anaemia, irritability, hysteria are well known

The standardization or documented information of these plants are lacking, thus the present study was aim to explore the pharmacognostical, Phytochemicals and Physicochemical standardization of local Athil and Sedar leaves.

Materials and Methods

Plant material: Collected from near SAU Al Kharj.

3.1: Pharmacognostic evaluation:

Macroscopic studies

For the fresh plant phyllotaxy, lamina size using (Vernierscliper), surface, margin, apex, venation and colour visual identification were used.

Microscopic evaluation:

Powder of the dried leaves was used for the observation of powder microscopical character.

3.2: Phytochemical evaluation:

Identify the following phytochemicals in the extracts: alkaloids, saponins, tannins, anthraquinones, flavonoids, terpenoids and method used for phytochemical tests

3.3: Physiochemical evaluation:

Determination of moisture content (oven 105°C).

Determination of Ash values: (500–600°C Furnace)

Determination of extractive values:

A weigh amount (5g) of dried powdered material of each plant will be placed in four flasks. Distilled water, Methanol and petroleum ether 100 ml each are added to them and keep for 3 days and filtrate, dry (rotary evaporator) and weighed.

Results and Discussion

Macroscopic evaluation (Table-1): The lamina of Ziziphus nummularia was ovate and green in colour while Tamarix aphylla lamina was scale like and grey-green in colour. The size of lamina 10-40mm long and 6-30mm width was observed for Z. nummularia and 1-2mm embodded with stem was observed in T. aphylla.

Table: 1; Macroscopic studies of fresh Sidr (*Ziziphus nummularia*) **and** Athil (*T. aphylla*) **plant**

S.N	Microscopic characters	Sidr (*Ziziphus nummularia*)	Athil (*T. aphylla*)
1	Phyllotaxy	Alternate	overlap each other along the stem (Hair free, few and small)
2	Lamina	Ovate	scale-like
3	Size*	15-40mm long and 10-30mm width	1-2 mm long
4	Surface	Glabrous	NA
5	Margin	Entire/ Toothed (not clear)	NA
6	Apex	Obtuse/ Acute	NA
7	Venation	Palmate	overlap
8	Colour	Green	grey-green foliage
9	Taste	Characteristics	Characteristics

Microscopic studies: Microscopic studies of dried leaves of Z. nummularia was given in Figure 1-6 while T. aphylla leaves given in Figure 7-12.

Covering multicellular trichomes (Figure1 & Figure7).

Spiral shaped xylem vessel (Figure 2 & Figure 8),

Reddish colour tannin contents (Figure 3 & Figure 9)

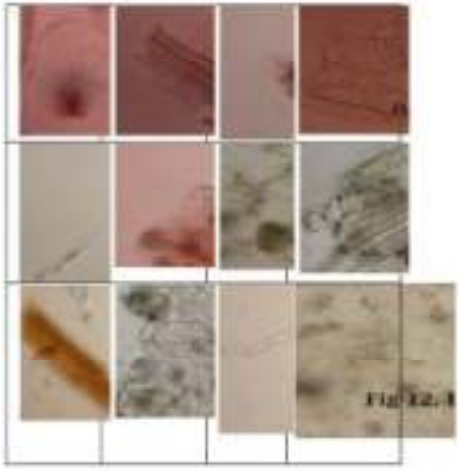
Stomata, anomocytic/ anomocytic (mostly), or

paracytic types (Figure 4 & Figure 10).

The fiber (Figure 5 & Figure 11)

Calcium oxalate (Figure 6 & Figure 12)

Easily differentiate with each other



Phytochemical studies (Table-2):

Table: 2; Phytochemical studies of Athil (*T. aphylla*) and Sidr (*Ziziphus nummularia*) plant leaf

Phytoconstituents	**Reagent**	Sidr (*Z. nummularia*)	Athil (*T. aphylla*)
Alkaloids	Mayer's	-	+
	Dragendroff's	+	+
Carbohydrates	Molisch's	+	+
	Fehling's	+	+
Glycosides	Killer-Killani test	-	-
Saponins	Foam Test	+	+
Steroids and Triterpenoids	Liebermann Burchard's	+	+
Fats & oils	Stain Test	+	-
Tannins	Ferric Chloride Test	+	-
Flavonoids	Lead acetate Test	+	+
Proteins & Amino acids	Ninhydrin Test	+	+
	Biuret Test	-	+

samples

* +/- (Presence/Absence)

Preliminary phytochemical analysis of powdered of plants of Ziziphus nummularia and Tamarix aphylla were carried out and were showed the rich sources of alkaloids, carbohydrates, glycosides, steroids and triterpenoids, fats and oils, Phenols and tannins, flavonoids, proteins and amino acids.

Physiochemical evaluation (Table-3):

Parameter	**Physicochemical parameters**	**Sidr**	**Athil**
Ash value	Total Ash*	3.063	2.629
	Water soluble*	0.328	0.418
	Acid insoluble*	2.439	2.176
Percentage moisture content	Moisture content*	6.94 % w/w	11.7 % w/w
Percentage extractive value	Petroleum ether(60-80) Extract *	2.6 % w/w	0.73 % w/w
	Methanol*	15.9 % w/w	15.73 % w/w
	Distilled water*	18.2 % w/w	16.12 % w/w

Table 3: Physicochemical parameters of Athil (*T. aphylla*) and Sidr (*Z. nummularia*) leaf

* Average values of leaf powdered (n=3),

The values of studied physiochemical parameters were summarized in table. Clearly gave the highly valuable information about the organic phytochemical present within the pharmacopeal limits.

CONCLUSION: Athil (Tamarix aphylla) and Sedar (Ziziphus nummularia) are very popular in Arab world, now the present scientific work report may help to identify to these plant scientifically and used in folklore medicine

Further study: Further study is required to explore the medicinal values of these plants.

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Semen Nigella

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Definition

Semen Nigella consists of the dried ripe seed of Nigella sativa Linn. (Ranunculaceae) recently removed from the capsule.

Synonyms

Nigella cretica mill, Nigella truncata vlv, Nigella indica Roxb. ex Flem.

Selected vernacular names

Black cumin, Fennel Flower, Roman Coriander, Nutmeg Flower, Black seed, Black Caraway, Damascena, Devil in-the-bush, Wild Onion Seed, cheveux de Venus, nigell, poivrette, Schwarzkummel (black carawayl, negulla, ala zeera (lit, black cumin), kalonji, krishnajiraka.

Geographical distribution

Nigella sativa is probably indigenous to the Mediterranean region and the Middle East but now found widely in India. The herb is cultivated around world i.e. Europe, North Africa, Egypt, Pakistan, Iran, Iraq and Turkey and in Bengal and North-East India.

Plant Description:

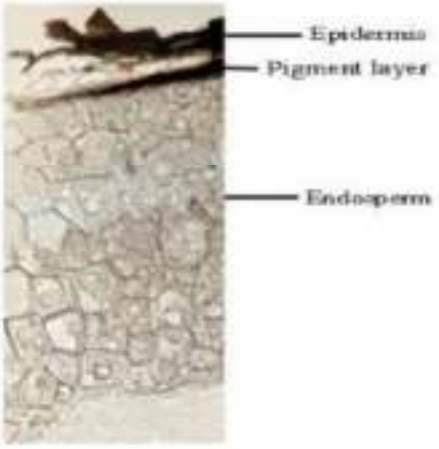
An annual herbaceous plant attaining up to about 60 cm in height. The leaves are greyish green, wispy and thread like, 2-3 pinnatisect, 2.5-5 cm long, cut into linear-lanceolate segments. The flowers are pale blue, 2.0-2.5 cm across, solitary on long peduncles and have five white with blue veins petals. Septal are ovate, acute, clawed. capsule 1.2 cm long; seeds flattened, oblong, angular, funnel shaped, small, 0.2 cm long and 0.1 cm wide, black in color. The plant grown between June and September, Flowering and fruiting occur from January to April.

Nigella sativa seed

Microscopic characteristics

Transverse section of seed shows single layered epidermis consisting of elliptical, thick walled cells, covered externally by a papillose cuticle and filled with dark brown contents. Epidermis is followed by 2-4 layers of thick walled tangentially elongated parenchymatous cells, followed by a reddish brown pigmented layer composed of thick walled, rectangular elongated cells. Inner to the pigment layer, is present a layer composed of thick walled rectangular elongated or nearly columnar, elongated cells, consists of thin walled, rectangular or polygonal cells mostly filled with oil globules. The powder microscopy of seed powder

shows brownish black, parenchymatous cells and oil globules.



General identity tests

Macroscopic and microscopic examinations.

Foreign organic matter: Not more than 2%w/w

Moisture content: 8.65%

Total ash: 4.41 - 6%w/w

Acid-insoluble ash: 0.2%w/w

Water soluble extractive: Not less than 15%

Alcohol-soluble extractive: Not less than 20%

Loss on drying: 4%7

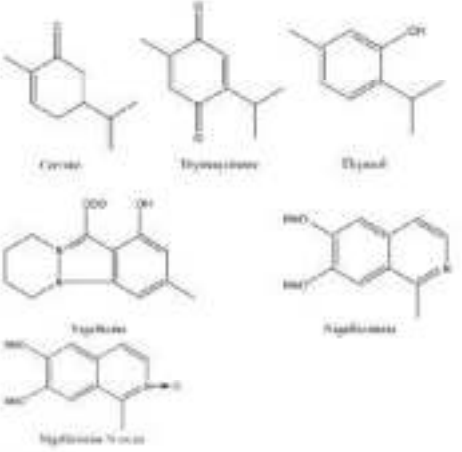
Heavy metals:

Component	mg%
Potassium	708-783
Magnesium	235-260
Calcium	564-572
Phosphorus	48.9-51.9
Sodium	18.5-20.8
Iron	8.65-9.42
Copper	1.48-1.65
Zinc	7.03-8.04
Manganese	3.37-4.43

Major chemical constituents

Phytochemical studies

The seeds are reported to contain nigellone, nigellicine, nigellimine, nigellimine-N-oxide, avenasterol-5-ene, avenasterol-7-ene, campesterol, cholesterol, citrostadienol, cycloeucalenol, 24-ethyl-lophenol, gramisterol, lophenol, 24-methyllophenol, obtusifolio, sitosterol, stigmastanol, stigmasterol, stigmasterol-7-ene, b-amyrin, butyrospermol, cycloartenol, 24-methylene-cycloartanol, taraxerol, tirucallol, 3-O-[[3-D-xylopyranosyl(1→3)-a-L-rhamnopyranosyl(1-2)-a-L-arabinopyranosyl)- 28-O-[a-L-rhamnopyranosyl (1→4)-(3-D-glucopyranosyl (1→6) b-D-glucopyranosyl] hederagenin, volatile oil (0.5-1.6%), fatty oil (35.6-41.6%), oleic acid, esters of unsaturated fatty acids with C15 and higher terpenoids, esters of dehydrostearic and linoleic acid, aliphatic alcohol, nigellidine, carvone, d-limonene, cymene, a,b-unsaturated hydroxy ketone, steroids, hederagenin glycoside, melanthin, melanthigenin, bitter principle, tannin, resin, protein, reducing sugar, glycosidal saponin, 3-O-[[b-D-xylopyranosyl-(1→2)-a-L-rhamnopyranosyl-(1→2)-b-D-glucopyranosyl]-11-methoxy-16,23-dihydroxy-28-methyloleun-12-enoate, stigma-5,22-dien-3-b-D-glucopyranoside, cycloart-23-methyl-7,20,22-triene-3b,25-diol, nigellidine-4-O-sulfite, nigellamines A3, A4, A5, C, nigellamines A1, A2, B1, and B2.



Seed oil

The seed oil contains cholesterol, campesterol, stigmasterol, b-sitosterol, a- spinasterol, (+)-citronellol, (+)-limonene, p-cymene, citronellyl acetate, carvone, nigellone, arachidic, linolenic, linoleic, myristic, oleic, palmitic, palmitoleic and stearic acids. Fixed oil: linoleic acid (55.6%), oleic acid (23.4%) and palmitic acid (12.5%). Volatile oil: trans anethole (38.3%), p-cymene (14.8%), limonene (4.3%), and carvone (4.0%), 2-(2-methoxypropyl)-5-methyl-1,4-benzenediol, thymol and carvacrol. Root and shoot are reported to contain vanillic acid.

Traditional uses

Traditionally the seeds and its oil are used in several diseases. The seeds are considered as bitter, pungent, aromatic, appetizer, stimulant, diuretic, emmenagogue, galactagogue, anthelmintic, acrid, thermogenic, carminative, anodyne, deodorant, digestive, constipating, sudorific, febrifuge, expectorant, purgative, abortifacient. They are used in ascites, cough, jaundice, hydrophobia, fever, paralysis, conjunctivitis, piles, skin diseases, anorexia, dyspepsia, flatulence, abdominal disorders, diarrhoea, dysentery, intrinsic hemorrhage and amenorrhea. Seed oil is a local anesthetic.

Clinically supported evaluation data

In the clinical trial with female UTI patients, there was decrease in pus cells in the urine after the patients were treated with seed extract.

Alcoholic extract of seeds depressed both the systolic and diastolic blood pressure.

Anticestodal effect of seeds studied in children indicated positive results without any adverse side effects.

A double-blind, placebo-controlled study of acute tonsillopharyngitis patients was conducted to examine clinical effectiveness of N. sativa. At the end of treatment a significantly greater proportion of patients in the NS group than in the placebo group had their sore throat completely relieved.

A double-blinded crossover clinical trial conducted on children with refractory epilepsy. The aqueous extract of black seed decreased mean frequency of seizures significantly during treatment.

The prophylactic effect of NS for 3 months on asthmatic patients was examined. The frequency of asthma symptoms, chest wheezing and PFT values were significantly improved.

The effect of NS seed supplement on symptom levels, polymorphonuclear leukocyte functions, lymphocyte subsets and hematological parameters of allergic rhinitis patients was evaluated. It was found to be a potential adjuvant therapy for allergic rhinitis.

A randomized double blind controlled trial on 123 patients for effectiveness, safety and tolerability of powdered seed in capsules on serum lipid levels, blood sugar, blood pressure and body weight in adults were evaluated. Favourable impact of powdered seeds in capsules was noted in almost all the variables.

Experimental pharmacology

Antitumor activity

Antidiabetic activity

Cardiovascular activity

Gastroprotective activity

Pulmonary activity

Nephroprotective activity

Hepatoprotective activity

Anti-inflammatory activity

Immunomodulatory activity

Central nervous system activity

Anticonvulsant activity

Antinociceptive activity

Anxiolytic activity

Antioxidant activity

Antioxytocic activity

Post-coital contraceptive activity

Abortifacient activity

Anti-implantation activity

Diuretic activity

Antiurolithatic activity

Spasmolytic activity

Opioid dependence treatment

Experimental autoimmune encephalomyelitis (EAE)

Antibacterial activity

Antifungal activity

Anti-schistosomiasis agents

Anthelmintic activity

Toxicity

The drug is traditionally considered to be safe.

The LD50 of the fixed oil values by single doses orally and intraperitoneally administered in mice were 28.8 ml/kg b.w., and 2.061 ml/kg b.w., respectively.

The LD50 of the alcoholic extract was reported to be 561 mg/kg i.p. in albino mice.

In a chronic toxicity study in rats, the fixed oil in oral doses of 2 ml/kg b.w administered daily for 12 weeks showed changes in hematological parameters. However, there was no change in histological and biochemical parameters in liver, heart, kidney and pancreas.

Acute and sub-acute toxicity of the aqueous, methanol and chloroform extracts of the seeds have been investigated. Degenerative changes in hepatic cells have been observed only with aqueous extract of the seeds suggesting the hepatic toxicity with the extract.

The safety of N. sativa fixed oil and essential oil in rats were evaluated. The serological indices like liver and kidney functioning tests, serum protein profile, level of cardiac enzymes, electrolytes balance, indices of red and white blood cells remained in normal range indicating its safe use.

Adverse reactions

Contact Dermatitis, Kidney or Liver Damage

Contraindications

None reported.

Warnings

Never take the oil on a full stomach. It needs to be mixed with another liquid such as juice, yogurt or honey and taken one hour before the meal. If taking the oil twice in a day, then the oil should be mixed with honey or juice and taken before bedtime. If taking the seeds, they must be heated. Never take the seeds that have not been heated as they will upset the stomach.

Precautions

Drug interactions

None reported.

Pregnancy:

It is not recommended for pregnant women.

Development of TLC Methods for Differentiation between commonly used Umbelliferous Spices

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INTRODUCTION

Many of the fruits belonging to the family Umbelliferae (Apiaceae) are commonly used spices and also constitute an important part in folk medicine and drug industry. These fruits contain mainly volatile oils of different compositions give each of them a characteristic odour and taste. Most if not all baby products contain extracts or oils of these fruits (1, 2). Differentiation between

these closely related spices is usually a tedious process. Detailed histology of the fruits can provide a differentiation tool (1- 5). This study needs expert in this field and in some cases can not be conclusive. HPLC and GC analysis can provide a differentiation tool. However, these tools allow the of one sample per run and consequently will be time consuming. TLC finger prints can be an easy fast tool in order to differentiate between these species (6).

In this work we attempted to develop TLC systems for such purpose using both normal and reversed phase silica gel.

EXPERIMENTAL

Extraction: The samples were purchased from the local market at Al-Kharj city and identified by comparison with samples preserved at the College herbarium. The seeds were powdered and extracted using soxhlet apparatus with CH_2Cl_2 followed by MeOH. The extracts were concentrated under reduced pressure using rotary vacuum evaporator and transferred to 25 ml volumetric flasks and completed to mark with the same solvent used for extraction.

Chromatographic Conditions: Using TLC plates and RP18 silica gel plates volume of 2 and 4 mL were applied from each extract. Samples were applied to the TLC plates as 6 mm bands using a Camag Automatic TLC Sampler 4 (ATS4) sample applicator (Switzerland) fitted with a Camag microlitre syringe. Application rate of 150 nl/s was used. The plates were developed to a distance of 80 mm in a Camag Automatic Developing Chamber 2 (ADC2) previously saturated with mobile phase vapour for 30 min at 22°C. After development and drying, the plates were scanned at 254, 366 nm and after spraying with anisaldehyde/H_2SO_4 using a Camag TLC scanner IV in absorbance mode, using the deuterium lamp. The slit dimensions were 4.00 × 0.45 mm and the scanning speed was 20 mm/s.

Mobile Phases: The following systems were used:

System code	System composition	
I	Hexane/EtOAc	8:2
II	CHCl3/ MeOH	9:1
III	EtOAc/MeOH/H2O	15: 3: 2
IV	MeOH/H2O	7:3
V	MeOH/H2O	8:2

RESULTS AND DISCUSSION

The results of the TLC study in different systems in both Silica gel plated and RP18 reversed phase plates visualized by UV light at 254, 366 nm, anisaldehyde/H_2SO_4 and/ or phosphomolybdic acid. The plates revealed that the extracts are different from each other in the number and R_f values of spots. All systems used revealed significant differences between the CH_2Cl_2 and MeOH extracts. Any of the above systems on any silica gel or RP 18 plates can be used for differentiation between the closely related drugs in an easy, fast, cost effective method not required specific experience. May samples can be analysed on the same plate.

Fig 1: Photograph of the used Umbelliferous seeds

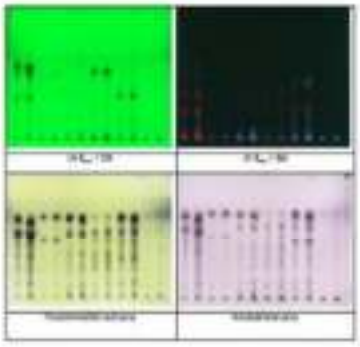

Fig. 2: HPTLC of CH_2Cl_2 and MeOH extracts in system I.

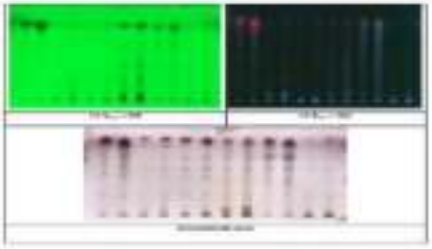

Fig. 3: HPTLC of CH_2Cl_2 and MeOH extracts in system II.

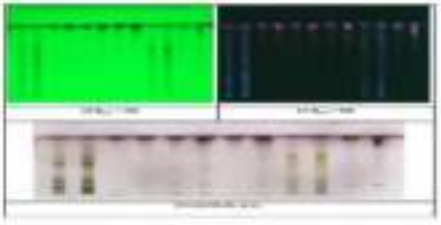

Fig. 4: HPTLC of CH_2Cl_2 and MeOH extracts in system III.

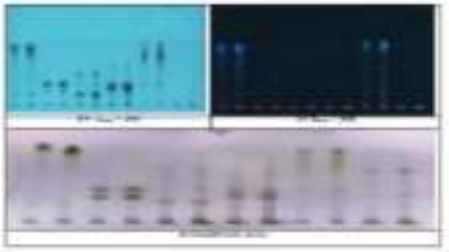

Fig. 5: HPTLC of CH_2Cl_2 and MeOH extracts in system IV

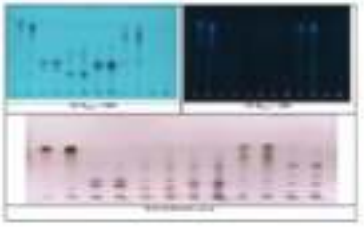

Fig. 5: HPTLC of CH_2Cl_2 and MeOH extracts in system V.

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Determination of the amounts of Caffeine in Coffee seed subjected to different treatments

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INTRODUCTION

Caffeine (CF), is one of the xanthine derivates 1,3,7-trimethylxanthine. It occurs naturally in Coffee seeds, tea leaves and Guarana seeds. Caffeine is a white crystalline weakly basic plant alkaloid. It is found in many food products such as cola nuts, coffee, tea, cacao beans, mate and other plants. Beverages containing caffeine, such as coffee, tea, soft drinks, and energy drinks, enjoy great popularity. In North America, 90% of adults consume caffeine daily (1). caffeine is classified by the Food and Drug Administration as generally recognized as safe is that toxic doses (over 10 grams for an average adult) are much higher than typically used doses (less than 500 milligrams). Ordinary consumption has low health risks, even when carried on for years – there may be a modest protective effect against some diseases, including Parkinson's disease (2, 3), heart disease (4), and certain types of cancer. In recent years, xanthine derivatives have received an increased attention in the food and nutrition industry because they can cause various physiological effects. CF is used as a central nervous system, cardiac, and respiratory stimulant. Caffeine also has a diuretic effect (5).

The most popular techniquesfor the determination of CF in different mixtures, especially inthe recent reports, consist of high-performance liquid chromatography (HPLC) and its variants (6–15). Other methods include batch UV–vis spectrophotometry (10,11), thin-layerchromatography and its variants (6,17–20), ion chromatography(21), Fourier transform-Raman spectrometry (22), Fouriertransform-infrared spectrophotometry (23).

EXPERIMENTAL

Sample preparations:

The samples were purchased from the local market at Al-Kharj city. The seeds were powdered and 5 gm from each sample were extracted separate by boiling with water for two minutes. The resulted decoctions were filtered and filtrates were transferred to 100 ml volumetric flask. Mixture of EtOH and H_2O were used to complete the volume with final ration of 1:1 EtOH and H_2O.

Chromatographic Conditions:

The TLC system composed of EtOAc/MeOH 85:15 was used as mobile phase. It resulted in a symmatric nice resolved spots corresponding to caffeine at R_f value = 0.38 (Fig 1).

Standard Solution:

Standard solution was prepared by dissolving 10 mg of caffeine in 100 ml of 1:1 EtOAc/H2O mixture. A volume of 1, 2, 3, 4, 5, 6, 7, 8 mL were applied on silica gel plates to obtain the calibration curve (Fig 2).

Sample application:

From each sample solution 1 mL was applied to TLC silica gel plates. Samples were applied to the TLC plates as 6 mm bands using a Camag Automatic TLC Sampler 4 (ATS4) sample applicator (Switzerland) fitted with a Camag microlitre syringe. Application rate of 150 nl/s was used. The plates were developed to a distance of 80 mm with hexane: ethyl acetate (8.5:1.5 v/v) and methanol : acetone (4:6 v/v) for Method I and Method II respectively as mobile phase in a Camag Automatic Developing Chamber 2 (ADC2) previously saturated with mobile phase vapour for 30 min at 22°C. After development and drying, the plates were scanned at 275 nm (Fig 3) using a Camag TLC scanner IV in absorbance mode, using the deuterium lamp.

The slit dimensions were 4.00 × 0.45 mm and the scanning speed was 20 mm/s.

Table 1: Contents of caffeine in different types of coffee.

Sample no.	% w/w
1 (Medium dark coffee)	0.83
2 (Light coffee)	0.88
3 (Dark coffee)	0.67
4 (Coffee seeds coat)	0.25
5 (Roasted Arabic Coffee)	0.89
6 (Raw Coffee)	0.73

RESULTS AND DISCUSSION

The results of estimation of the percent of caffeine in different types of coffee seeds are presented in Table 1. A clear relation could be observed between the caffeine contents and the roasting time. The darker brand contains the least amount of caffeine among the other brands. Coffee seed coats contain some caffeine but much less than coffee seeds. The raw should contain the highest amount as it did not subject to any heat. However, the results do not support such suggestion. This may be explained by the fact that roasting will lead to some caffeine loss and also more weight loss due to evaporation of the water contents.

As a conclusion from the present study darker types of coffee contain less caffeine than lighter ones. However, customers make compromise between caffeine contents and the taste they prefer.

Fig 1: Photograph of different varieties of coffee

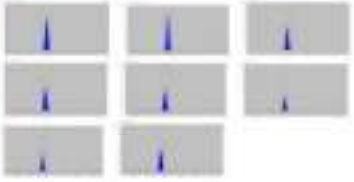

Fig 2: Chromatogram of standard and samples of Caffeine extracted from different coffee samples

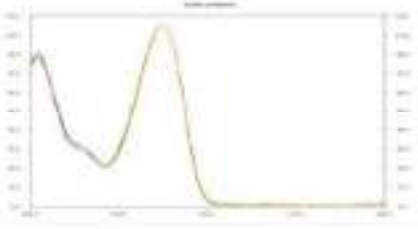

Fig. 3: UV absorption spectrum of caffeine.

Fig. 4: TLC plates of standard and caffeine extracted from different coffee samples

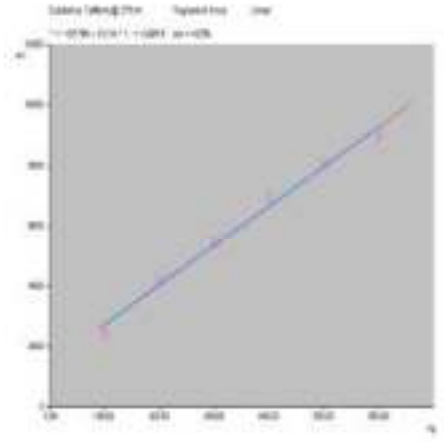

Fig 5: Standard calibration curve of Caffeine.

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Assessment of Airborne Bacteria And Fungi In Some Indoor Environments In Alkharj City

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ABSTRACT. Biological aerosol particles, such as bacteria, fungal cells and viruses, are airborne particles. they are living living organisms, or released from living organisms. Although many of them are nonpathogenic, there is increasing evidence that exposure to such bioaerosols is associated with a wide range of health effects including infectious diseases, acute toxic effects, allergies, and cancer. Airborne indoor bacteria and fungi were assessed using conventional method to investigate the enumeration and identification of airborne micro-organisms. This was determined through air quality sampling using the 'open plate technique'. The air samples were collected during the from different locations. These locations included living rooms, kitchens, classrooms, prayer hall in one mosque. Cultivation and total microscopic enumeration methods were employed for the sample analysis. Different groups of bacteria and fungi were detected. Four genera of fungi, mainly related to the genus Aspergillum, were isolated from all residents. Bacteria shows higher growth numbers as opposed to the slow growing fungi.

INTRODUCTION

Air pollution is considered as one of the major environmental problem facing the world in this century. We seemingly live in a hostile world filled with different types of pollutants of diverse shape, size, composition and types. Exposure to bio-aerosols, containing airborne microorganisms and their by-products, can result in respiratory disorders and other adverse health effects such as infections, hypersensitivity pneumonitis and toxic reactions (Gorny *et al.*, 2002; Fracchia *et al.*, 2006). Microbial pollution is a key element of indoor air pollution. It is caused by hundreds of species of bacteria and fungi, in particular filamentous fungi, growing indoors when sufficient moisture is available, (WHO, 2009). Fungi are common in indoor and outdoor environments and nearly 10 % of people worldwide have fungal allergy. (Pasanen *et al.*, 1996). In many environments including hospitals, animal sheds, clean-rooms, pharmaceutical facilities and spacecraft

environments, the presence of bio-aerosols can compromise normal activities, making efficient monitoring crucial (Gorny, 2004; Stetzenbach, 2007).

Microbial damage in indoor/outdoor areas, is caused most frequently by molds and bacteria. These micro-organisms have a very important role in the biogeochemical cycle, as their task consists of disintegrating organic mass to reusable metabolites. In non-industrial indoor environments, the most important source of airborne bacteria is the presence of human (Stetzenbach, 2007). Specific activities like talking, sneezing, coughing, walking, washing and toilet flushing can generate airborne biological particulate matter. In addition food stuffs,

house plants and flower pots, house dust, pets and their bedding, textiles, carpets, wood material and furniture stuffing, occasionally release spores of *Alternaria*, *Aspergillus*, *Botrytis*, *Cladosporium*, *Penicillium*, *Scopulariopsis* into the air (Cox and Wathes, 1995; Maelr *et al*., 2002). Gram-positive bacteria predominate in dusts of animal origin, but are also present in dusts of plant origin, such as *Corynebacteria*, *Bacillus* spp., *Staphylococcus* spp., *Micrococcus* spp. and *Streptococcus* spp. (Dutkiewicz, 1997). Gram negative bacteria of different origins, the coliform bacteria, *Campylobacter* and *Salmonella* species, could be present in air on its origin

The objective of this study was to investigate the airborne fungi and bacteria collected in indoor environment in some buildings in Alkharj city at Saudi Arabia. The study was carried out in three areas, using conventional enumeration of airborne micro-organisms and relied on a culture-based method for bio-aerosol sampling. The primary goal of the bio-aerosol sampling was the quantitative evaluation of the viable airborne bacteria and fungi using the standard enumeration of culturable microbes as CFU/m3.

MATERIALS AND METHODS

Description of locations: Alkharj city is located in the middle area of the kingdom of Saudi Arabia. Sample site were one school, a mosque and a house. The air sampling was performed during regular morning hours (between 9. 30 and 12.00) on workdays.

Sampling: The samples were collected with Biological aerosols using open plate method. Impingement method.

Isolation media for bacteria: Tryptone soya agar medium was used for isolation of total bacteria (pancreatic digest of casein 5%; sodium chloride 2%; pancreatic digest of soy bean meal 0.5%; magnesium sulfate 0.15% and agar 1.5%). Macconkey agar medium was used for isolation of gram negative bacteria (peptone from casein 1.7%; peptone from meat 0.3%; sodium chloride 0.5%; lactose 1%; bile salt mixture 0.15%; neutral red 0.003%; crystal violet 0.0001% and agar 1.35%).

Isolation media for fungi: Rose Bengal streptomycin agar medium was used for the isolation of fungi (dextrose 1%; peptone 0.5%; potassium dihydrogen phosphate 0.1%; magnesium sulphate 0.05% and agar 1.5 %), 1gm powdered streptomycin was dissolved in 33ml sterile pure water, 0.2ml of this solution was added; and then 1ml of solution of 0.5 gm powdered Rose Bengal stain was dissolved in 150 ml sterile pure water was added to the medium.

Gram Stain: Using Hucker's modification (Laskin and Lechevalier, 1973). The Gram stain uses four different reagents, the initial stain is crystal violet, and potassium-iodide solution is then added. Decolorization was carried for 30 seconds with 95%alcohol. The safranin counter stain is added, washed and immersion oil is added. Gram positive cells stained dark blue whereas Gram negative bacteria cell appeared pink to red.

Identification of fungal isolates: Fungal isolates were mainly identified by direct observation on the basis of micro and macro morphological features on Sabouraud dextrose agar, Czapek Dox agar and malt extract agar, reverse and surface coloration of colonies. All cultivable isolates were identified to the genus level except the thermophilic one to the species level using various literatures (Raper and Fennell, 1965; Ellis, 1971; Barnett, 1972; Singh et al., 1991 & Barnett and Hunter, 1999).

RESULTS

Table1. Total bacterial counts in selected location for bioaerosols analysis

No	sample	Location	CFU/plate	CFU/Min
1	A1	Ideal classroom	8	0
2	A2	Ideal classroom	25	8
3	A3	Ideal classroom	8	2
4	B1	Prayerhall	15	8
5	C1	Kitchen	2	0
6	C2	livingroom	14	5
7	D1	Room mirzan1	7	0
8	D2	Room mirzan2	15	8

Table 2. Total fungal counts in selected location for bioaerosols analysis.

No	sample	Location	CFU/Min	CFU/plate
1	A1	Ideal classroom	11	28
2	A2	Ideal classroom	2	4
3	A3	Ideal classroom	1	1
4	B1	Prayerhall	1	2
5	C1	Kitchen	-	-
6	C2	livingroom	1	1
7	D1	Room mirzan1	-	4
8	D2	Room mirzan2	4	-

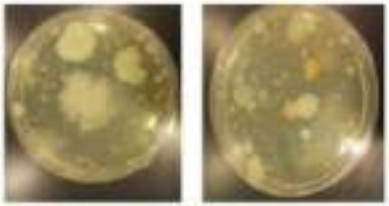

Figure 1. Bacterial Growth Showing Different Genera On Soy Tripticase Agar Medium

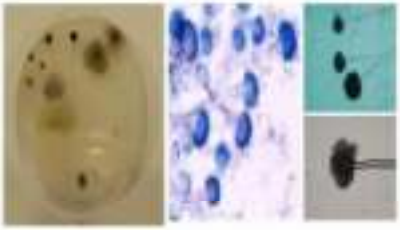

Figure 2. Fungal Growth of Different reprehensive genera of *Aspergillus* on Malt Extract -Yeast extract Agar Medium (right panel). Left panel show s microscopic examination of different reprehensive genera of grown Aspergilli.

CONCLUSION AND RECOMMENDATION

An assessment of the airborne bacteria and fungi in the indoor environment were experimentally investigated.

Experiments of total counts and types of airborne microorganisms were carried out at selected locations.

The current study clearly indicates that there is significant assessment of the indoor airborne bacteria and fungi.

Bacteria show higher growth comparing to slow growing fungi

Aspergillus flavus, *Aspergillus fumigatus*, *Aspergillus niger* and *Cladosporium* sp. were the predominant fungal genera.

Microbial indoor air quality in the living room at houses; class rooms and prayer hall was poor where the microbial occurrence was high.

Standardization of *Boswellia Serrata* Gum: A Comprehensive Approach

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ABSTRACT

The resin of *Boswellia* species has been used as incense in religious and cultural ceremonies and in medicines since time immemorial. *Boswellia serrata* (Salai/Salai guggul), is a moderate to large sized branching tree of family Burseraceae (Genus Boswellia), grows in dry mountainous regions of India, Northern Africa and Middle East. Oleo gum-resin is tapped from the incision made on the trunk of the tree and is then stored in spetially made bamboo basket for removal of oil content and getting the resin solidified. After processing, the gum-resin is then graded according to its flavour, colour, shape and size. The oleo gum-resins contain 30-60% resin, 5-10% essential oils, which are soluble in the organic solvents, and the rest is made up of polysaccharides. Gum-resin extracts of *Boswellia serrata* have been traditionally used in folk medicine for centuries to treat various chronic inflammatory diseases[1]. In this research work, a comprehensive and systematic methodology for the proper standardization *Boswellia serrata* has been depicted. Various quality control parameters such as organoleptic evaluations like colour, odour, taste and consistency; physico-chemical evaluation like loss on drying, total ash, acid insoluble ash, water soluble ash, pH of 1 & 10 % solution, extractive values, along with HPLC fingerprint profiling have been carried out in triplicate. The approach will help in developing systematic quality control methods which can be successfully adopted by the herbal industry for the routine standardization of this important drug.

INTRODUCTION

About 25% of the drugs prescribed worldwide come from plants, 121 such active compounds being in current use. Of the 252 drugs considered as basic and essential by the World Health Organisation (WHO), 11% are exclusively of plant origin and a significant number are synthetic drugs obtained from natural precursors[2]. Generally it is believed that the risk associated with herbal drugs is very less, but reports on serious reactions are indicating to the need for development of effective marker systems for isolation and identification of the individual components. Standardization, stability and quality control for herbal drugs are feasible, but difficult to accomplish[3]. The purpose of standardization of medicinal plant products is to ensure therapeutic efficacy and to check any adulteration or non deliberate mixing in commercial batches. The quality control of plant products is a general requirement to be fulfilled. Good quality assurance is necessary when dealing with the plant products, intended to be released in market as drug constituents or as test substances in basic pharmacological experiments. Therefore efforts should be made t obtain and maintain the high quality of these plant products.

Experimental

Loss on Drying

This parameter determines the amount of moisture as well as volatile components present in a particular sample. The powdered drug sample (2 gm) was placed on IR moisture balance and dried at 105°C for 2 hours noted the reading. The drying was continued until two successive reading matches each other or the difference between two successive readings was not more than 0.25%.

Total ash

Placed about 2-3 g grounded dried material, accurately weighed in a previously ignited and tared silica or platinum crucible. The material was spread in an even layer and ignited it gradually by increasing the heat 500-600° C until it becomes white (indicating the absence of carbon). Cooled in a desiccator and weighed, if a carbon free ash was not obtained in this way, exhaust the charred mass with hot water, collect the residue on an ashless filter paper, incinerate the residue and filter paper 500-600° C.

Acid insoluble ash

The acid insoluble ash test is designed to measure the amount of ash insoluble to diluted hydrochloric acid. Dissolved total ash in 25 mL of dil. HCl (3 N) acid and boiled the solution for five minutes. Then filtered the solution through ashless filter paper. Washed the residue twice with hot water. Then ignited the crucible at 500-600° C until it become white in colour. Cooled in a desiccator and weighed. The percentage of ash with reference to the air dried drug was calculated.

Water soluble ash

Dissolved total ash in 25 mL of distilled water and boiled the solution for five minutes. Then filtered the solution through ashless filter paper. Washed the residue twice with hot water. Then ignited the crucible at 500-600° C, until it becomes white in colour. Cooled in a desiccator and weighed. Subtracted the weight of insoluble matter from the weight of the ash, the difference represents the water soluble ash. The percentage of ash with reference to the air dried drug was calculated.

PH of 1% suspension

One g of the accurately weighed drug was dissolved in water (100 mL) and filtered. pH of the filtrate was checked with a pH meter.

pH of 10% suspension

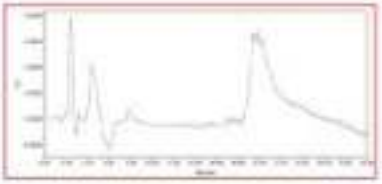
Ten g of the accurately weighed drug was dissolved in water (100 mL) and filtered. pH of the filtrate was checked with a pH meter.

Estimation of Boswellic acids in Boswellia serrata by Titration method

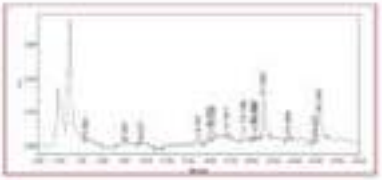
Weigh accurately about 0.5g of the sample and dissolve in 5 ml of methanol by keeping in a sonicator for 5-10 minutes. Titrate against 0.01n sodium hydroxide using phenolphthalein as indicator. Perform a blank titration using methanol.

HPLC Chromatographic conditions

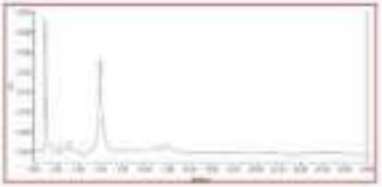
The fingerprint analysis has been carried out on a Waters Alliance e2695 separating module (Waters Co., MA, USA) using UV detector (Waters 2998) with autosampler and column oven. The instrument was controlled by use of "BREEZE" software installed with equipment for data collection and acquisition. Compounds were separated on a C18 reverse phase column (150 x 4.6mm, particle size 5 µm, Merck, Germany) maintained at room temperature. After different trials the mobile phase for the fingerprint analysis was selected as acetonitrile: water in the ratio of (50: 50 v/v). This mobile phase helped to get maximum number of constituents with good separation in both methanol and chloroform extract. The wavelength for the anlaysis was kept as 254 nm. Flow rate and injection volume were 1 mL/min. and 10 µL, respectively. All chromatographic operations were carried out at ambient temperature.



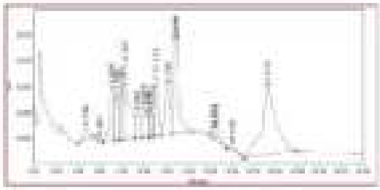
HPLC chromatogram of methanol blank at 254 nm



HPLC chromatogram of methanolic extract of Boswellia serrata 254 nm



HPLC chromatogram of chloroform blank at 254 nm



HPLC chromatogram of chloroform extract of Boswellia serrata 254 nm

Table 1: Physico-chemical evaluation of Boswellia serrata

Parameter	Observation (n=3)
Colour	Off white
Odour	Characteristic
Taste	[illegible]
Consistency	[illegible]
Loss on drying at 105° C (%w/w)	[illegible]
Total ash (%w/w)	[illegible]
Acid insoluble ash (%w/w)	[illegible]
Water soluble ash (%w/w)	[illegible]
pH of 1% suspension	[illegible]
pH of 10% suspension	[illegible]
[illegible] (%w/w)	[illegible]
Chloroform extractive value (%w/w)	[illegible]
Methanol extractive value (%w/w)	[illegible]
[illegible] (%w/w)	[illegible]

Table 2: Summary of HPLC fingerprints of methanol & Chloroform extract of *Boswellia serrata*

HPLC fingerprint				
Extract	Mobile phase	RT	Area%	Detection wavelength
Methanol	[illegible]	[illegible]	[illegible]	[illegible]
Chloroform	[illegible]	[illegible]	[illegible]	[illegible]

CONCLUSION

The proposed method is simple, easy and time saving procedure which can be successfully used for the quality control and standardization of *Boswellia serrata* in crude drug and different herbal formulations under general laboratory conditions.

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Variation in essential oils in fresh and dry Aaronsohnia factorovskyi E.F. Warb. & Eig. growing wild in KSA

Fahd Al-Othimeen, Dr. Abd El Raheim Mohammed Donia

INTRODUCTION

Aaronsohnia factorovskyi E.F. Warb. & Eig (Yellow Chamomile) family Asteraceae widely used in many places in KSA as a separate drink or with tea, also it used as Antilithic, for intestinal colic, for gastric disturbanc, antidysentric, and renal calculi. Aaronsohnia factorovskyi showed cytotoxic activity against Brine Shrimp LC50 in µg/ml A. factorovskyi used in carminative, intestinal colic, Aqueous and methanol extracts of A. factorovskyi showed antioxidant activity. Therefore, the purpose of this work is to estimate and compare essential oil in fresh and dry Aaronsohnia factorovskyi to decide the best way for using this plant.

MATERIALS AND METHODS

Plant material

Aaronsohnia factorovskyi was collected in February 2014 from Rawdat Khoreim-Al-Romaeh-Riyadh- KSA, the collected plant was divided in to two parts; first part we used it fresh and the second part was dried under shade for 7 days.

Essential oil isolation- Fresh and dry aerials parts (Stems, leaves and flowers) were hydro-distilled in a Clevenger type apparatus for 4 hours. The oil was separated from water using diethyl ether.

GC-MS Analysis

The composition of essential oil was determined by the method of gas chromatography (GC) and a combination of gas chromatography mass spectrometry (GC-MS). GC was performed on the instrument of production Bruker. GC-MS was performed on the production of mass spectrometers.

The chemical compounds of essential oils were identified based on the retention time on silica capillary column and the matching of mass spectra with the standard library.

RESULTS AND DISCUSSION

About 137 and 130 chemical compounds of different concentration were isolated and identified by gas chromatography-mass spectroscopy in the essential oils of fresh and dry Aaronsohnia factorovskyi respectively.

Fresh sample

Isolation of the essential oils (aerial parts) (250g) of the fresh A. factorovskyi plant sample were subjected to hydro-distillation for 4h using a Clevenger-type apparatus to obtain the oils. Yellow colored oil was obtained 0.11% (v/w fresh weight) yield.

The major constituents of fresh A. factorovskyi oils were; CIS-4-Methyl-1-Ethenyl-1-Aceto (32.3%), β-myrcene (13.3%), β-cis-Ocimene (13.1%), Geranyl 3-Methylbutanoate (3.1), α-Pinene (2.4 %), E-poxy-Ocimene (0.5%), Z and E-poxy-Ocimene (0.5%) and Z--bota-Ocimene (0.4%).

Dry sample

Isolation of the essential oils (arial parts) (250g) of the dry A. factorovskyi plant sample were separately subjected to hydro-distillation for 4h using a Clevenger-type apparatus to obtain the oils. Yellow colored oil was

Systematic position of *Aaronsohnia factorovskyi*		
	Kingdom	Plantae
	ohyium	Tracheophyta
	class	Asterids
	Order	Asterales
	Family	Asteraceae
	Subfamily	Asteroideae
	Tribe	Anthemideae
	Genus	*Aaronsohnia*
Arabic name: -فرص فرقص	Species	factorovskyi E.F. Warb. &Eig

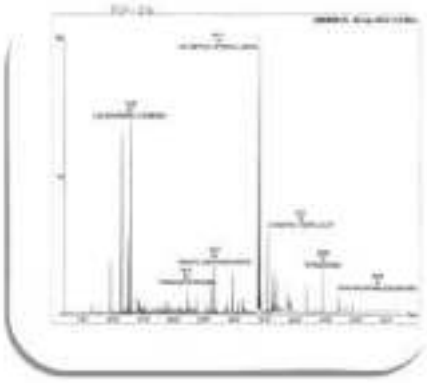

Fig. (1): A typical chromatogram of the constituents of essential oil from fresh *Aaronsohnia factorovskyi*.

Obtained 0.15% (w/w dry weight) yield. A. factorovskyi was dried under shade and dry

Weight percent of A. factorovskyi was calculated as 22.7%.

The major constituents of dry A. factorovskyi were; CIS-4-Methyl-1-Ethenyl-1-Aceto (36 %), β

-cis-Ocimene (4.5%) β-myrcene (2.6 %). Geranyl isova[illegible]mene (0

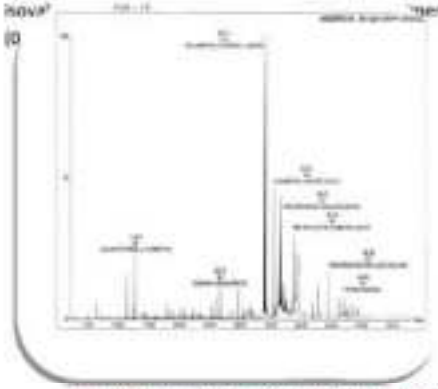

Fig. (2): A typical chromatogram of the constituents of essential oil from dry *Aaronsohnia factorovskyi*.

The differences between fresh and dry A. factorovskyi essential oils appeared in β-myrcene and Ocimene and α-Pinene. From previous studies α-pinene possess therapeutic use as an anticancer and anti-oxidant agent, also it showed antimicrobial activities. As well known myrcene possess analgesic and anti-oxidant activities of

Ocimene refers to several isomeric hydrocarbons. The ocimenes are monoterpenes found within a variety of plants and fruits. From these results we found that fresh sample of A. factorovskyi contains high relative percent of most oil constituents, further studies needed for biological evaluation of both fresh and dry samples.

CONCLUSION

GC-MS analysis of Aaronsohnia factorovskyi showed some variations in the percent of essential oil composition, which may affect on the activity of this plant, we suggested further studies for biological evaluation of both fresh and dry samples.