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Antioxidant Potential of *solanumkurzii* Br. Berry: A folk Medicinal food Berryused in Arunachal Pradesh, North- East India

By Temin Payum, A. K Das, C. Tamuly, R Shankar & M. Hazarika
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Abstract- Solanumkurzii Br. berry used as folk food medicine among the Adi tribe of Arunachal Pradesh. The methanol extract of berry were evaluated for total phenolic content (Folin-Ciocalteu's method), total flavonoid content (colorimetric method) and antioxidant potential ((DPPH & ABTS). The methanol extract contains considerable contents of phenolic (14.60 mg GAE/g) and flavonoid (89.00 µMRE/g) with antioxidant potential of 30.75 µM/g and 257.74µM/g in ABTS and DPPH assay respectively. The folk use as food and medicine and antioxidant potential of Solanumkurzii berry is discussed in the paper.

Keywords: solanumkurzii, phenolic content, flavonoid content, antioxidant, folk food, indigenous people.

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Antioxidant Potential of *solanumkurzii* Br. Berry: A folk Medicinal food Berryused in Arunachal Pradesh, North- East India

Temin Payum [α], A. K Das [σ], C. Tamuly [ρ], R Shankar [ω] & M. Hazarika [¥]

Abstract- **Solanumkurzii Br. berry used as folk food medicine among the Adi tribe of Arunachal Pradesh. The methanol extract of berry were evaluated for total phenolic content (Folin-Ciocalteu's method), total flavonoid content (colorimetric method) and antioxidant potential ((DPPH & ABTS). The methanol extract contains considerable contents of phenolic (14.60 mg GAE/g) and flavonoid (89.00 μMRE/g) with antioxidant potential of 30.75 μM/g and 257.74μM/g in ABTS and DPPH assay respectively. The folk use as food and medicine and antioxidant potential of Solanumkurzii berry is discussed in the paper.**

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I. Introduction

Nature has endowed plant kingdom with full of resources. Plant kingdom basically produced two types of compounds; plants nutrients to function directly for primary metabolic processes to regulate growth development and reproduction and allelochemicals or plant secondary compounds as plant chemical defences[1]. Since antiquity the plant resources has been used by human being for food and medicine. Let food be your medicine, once said Hippocrates over 2500 years ago.The civilizations in West assiduously follow the aphorisms of Hippocrates, "*Let food be thy friend and enemy*" for more than 200 years[2].In the second century before Christ, Marcus Porcinus Cato- the well-known Roman senator, lawyer and the enemy of Carthage used cabbage as food and a curative; he even tried to cure his ill wife and son with cabbage[2]. When a food becomes drugs; it is termed as "medical foods". The links of diet and health are no longer questioned[1]. Food and medicine represent a continuum rather than artificial categories; Overlapping nature of traditional food system and medicine lead to the investigation of phytochemicals that explains the food culture and health outcomes[3]. Any of the edible wild plants that are included in local food baskets have both therapeutic and dietary functions and such medicinal foods have been part of Eastern Medicinal theories since ancient times and have recently received attention in the USA and Europe within the fields of functional foods, nutraceuticals and phyto-nutrients[4]. Nutritional therapies including the use of alternative traditional medicinal plants and herbal food with various principles and properties have witnessed renewed interest in the last few decades[5, 6, 7].The knowledge on plant as medicine is orally transferred from generation to generation as "traditional medicines". Traditional medicines are still practices in many pockets of tribal belts all over the world. The role and importance has been identified by World Health Organization and figured at around 80% in developing countries those who depends traditional medicines in primary health care system.Fruit and vegetables are major sources of dietary antioxidant[8]. Dietary antioxidants prevent oxidative damages. Antioxidant of a plant is largely contributed by presence of phenolic compounds and flavonoids[9]. Large numbers of wild edible plants are rich in phenolic compounds[10, 11]. Crude extracts of herbs and spices, therefore plant materials rich in phenolic compounds are of increasing interest in the food industry because they retard oxidative degradation of lipids and thereby improve the quality and nutritive value of food[12].

In India, 461 ethnic groups are recognized as Scheduled Tribes. These are considered to be India's indigenous peoples; the largest concentrations of indigenous peoples are found in the seven states of North-East India, including Arunachal Pradesh and the so-called "central tribal belt". Arunachal Pradesh, an Indian state lies in North East of India, is a home of 26 major tribal people and more than 110 sub-tribes. The traditional practices, festive celebrations and traditional knowledge is as rich as the tribes itself, geographical isolation from the Indian mainland has brought them certain distinctive characteristics in culture and customs, the state has many dimensions in food habits and flavour. Indigenous people use numerous herbs, fruits, animals, insects, worm etc. in their folk food[13].

The indigenous people of East Siang District of Arunachal Pradesh, Indiause Solamunkurzii(Fig. 1) as folk food as well as folk medicine. Berry is eaten raw with locally prepared black alcoholic drink called

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"apong" in Adi or boiled and mashed with chilly and dried bamboo shoot powder (fig. 3) either berry is smoke dried over the fire and powdered with salt and chilly (fig. 4); berry powder is preserved in bamboo culmover fire place in a shelf locally called "boring or perap" for long period storage. Fresh berry (Fig.2) is advised to chew in toothache; and also used as expectorant during cough and cold, the water extract of berry is given to patient of stone problem. Berry is also used as appetizer and roughage. Solanumkurzii Br. (Solanaceae) is a shrub, grows naturally in burn and slash cyclic"jhum field" and domesticated in home-garden too, The Adi tribe locally calledSolanumkurzii as "kopir". Upto 4 ft. high with densely stellate-tomentose leaves, flowers purplish in densely stellate woolly racemes, berry glabrous, globose, bitter and orange on ripe[14].

In recent past, wild fruit and antioxidant potential from North East India, in particular; wild fruit found in Arunachal Pradesh have been studied by Jambey et al., (2012)[15] on Garcinia species fruit and Payum et al.,(2013)[13] on Phoebe cooperiana fruit. Literature achieve has no recordable record to be recorded on Solanumkurzii berry in relation to phenolic, flavonoid and antioxidant activities work till date. Present study was carried out to determine total phenolic content, total flavonoid content and antioxidant potential of ethno-biologically and culturally useful folk medicinal food berry of Solanumkurzii among the indigenous people of Arunachal Pradesh, North east India.




Figure 1 : S.kurzii(Twig). *Figure 2 :* Berry *Figure 3 :* Boiled berry *Figure 4 :* Bowdered berry

II. Material and Methods

Chemicals and Solvents : The chemicals 2,2-Diphenyl-1-picrylhydazyl (DPPH), Gallic acid, ferric chloride, 2,2-azino-bis-(3-ethylbenzothiazoline-6-sulfonic acid) (ABTS) were obtained from Sigma-Aldrich (Munich, Germany). Merck's Folin-Ceocalteu was used and other reagents and chemicals of analytical grade were Merck (Mumbai, India) and RANKEM (New Delhi, India).

Preparation of crude extract : Fresh berry were collected from Renging Village, Mirem Village, Sile Village and Napit Village of East Siang District, Arunachal Pradesh, India. Berries were cleaned with distilled water before oven dried at 55 degree Celsius and heated till constant weight was achieved; dried berries were grinded in laboratory mill and kept in air tight container for future use. 100g powder were soaked in 500 ml methanol for 48 hrs and filtered through Whatman paper No.41. The residue was re-extracted twice with 500 ml of methanol each. The total filtrate was concentrated by rotatory evaporator at 45^0 C under reduced pressure and stored at -40^0C until analysed.

Determination of Antioxidant Activity using 2, 2-Diphenyl-1-picrylhydazyl (DPPH) Free Radical Scavenging Method: DPPH stable free radical method is an easy; rapid and sensitive way to survey the antioxidant activity of specific compound or plant extracts. The antioxidant activity was determined according to the method of Aoshima et al., [16]. Briefly, to 100 μl of sample extract, or standard, 2.9 mL of DPPH reagent (0.1mM in methanol) was added and mixed vigorously. The reaction mixture was stored in the dark for 30 minute at room temperature and decolouration of DPPH was measured against a blank at 517 nm using an ultraviolet-visible (UV-Vis) spectrophotometer (Lamda-25, Perkin Elmer, Cambridge UK). Linear calibration curves were produced with R^2=0.9998 *(Fig. 5.)* and result was calculated as Trolox equivalent per *gram dry sample.* The inhibition % was calculated using the formula:

$$\text{Inhibition\%} = \frac{\text{A (control)} - \text{A (test sample)}}{\text{A (control)}} \times 100$$

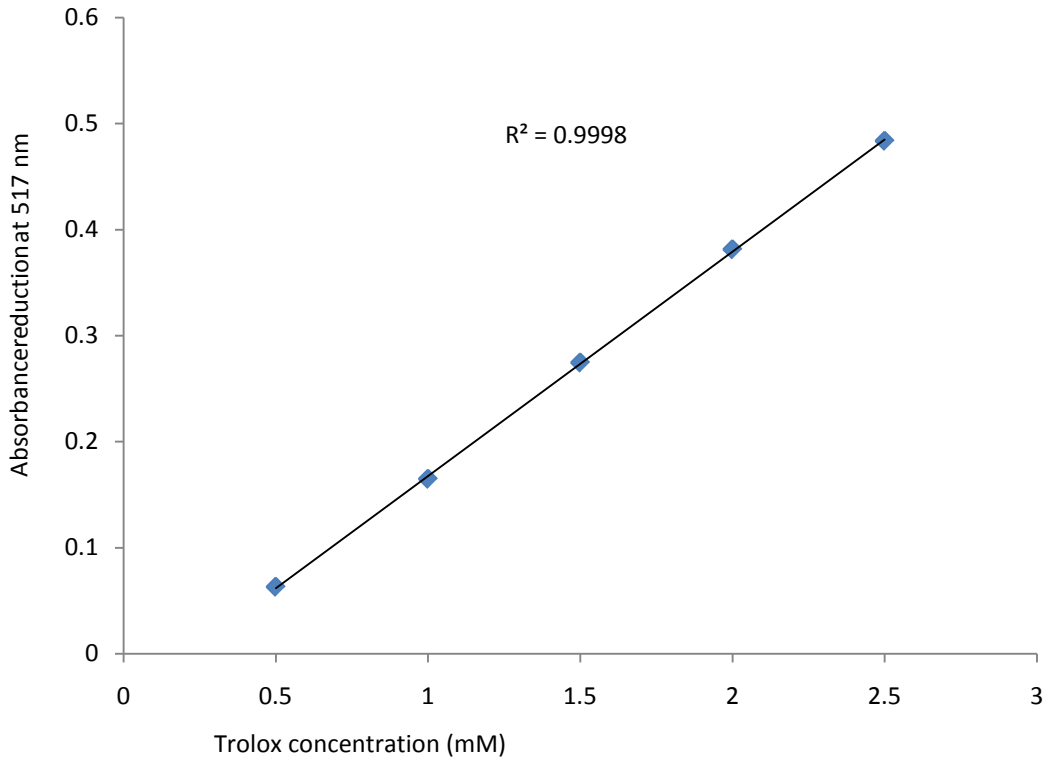

Figure 5 : Trolox concentration vs absorbance of DPPH standard curve

ABTS Free Radical Scavenging Assa : The ABTS radical cation scavenging activity was performed according to Re et al., [17]with slight modifications. The ABTS solution (7mM) was reacted with potassium persulfate (2.45mM) solution and kept overnight in dark to yield a dark green-colour solution containing ABTS radical cation. Prior to use in the assay, the ABTS radical cation was diluted with 50% methanol for an initial absorbance of about 0.700± 0.02 at 734nm using UV-Vis spectrophotometer with the temperature set at 30 ^{0}C. Free radical scavenging activity was assayed by mixing 100μL of test sample with 2.9ml of an ABTS working standard in a microcuvette. The decrease in absorbance was measured at exactly 1 minute after mixing the solution and then at 1 minute intervals up to 6 minutes when final absorbance was recorded. Linear calibration curves were produced with R^2= 0.9986 ***(Fig. 6.)*** for evaluation of antioxidant activity in ABTS and result was calculated as Trolox equivalent per gram dry sample. The inhibition % was calculated using the formula:

$$\text{Inhibition\%} = \frac{\text{A (control)} - \text{A (test sample)}}{\text{A (control)}} \times 100$$

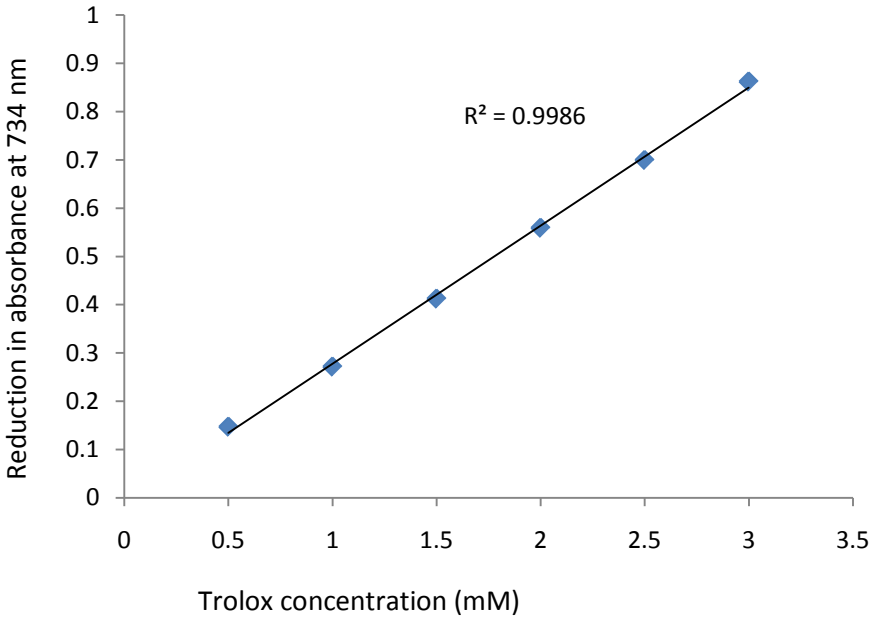

Figure 6 : Trolox concentration vs absorbance for ABTS standard curve

Determination of Total Phenolic Content : Total phenolic content was determined by the Folin-Ciocalteu method[18].Briefly, to 900μL of distilled water and 1mL of the Folin-Ciocalteu reagent 100μL of filtered extract was added. After 5 minutes, 2mLof saturated sodium carbonate (75g.L-1) and 2 mL water was added. Absorbance of the resulting blue- colored solution was measured at 765nm using UV-Vis spectrophotometer after incubation at 30 0C for 1.5 h with intermittent shaking. Quantification measurement was performed based on a standard calibration curve of 20, 40, 60, 80 and 100mg/100mL of Gallic acid in 80% methanol. Total phenolic content was expressed as Gallic acid equivalent (GAE) in the dry sample. Linear calibration curves were produced with R^2=0.9989 (***Fig.7).***

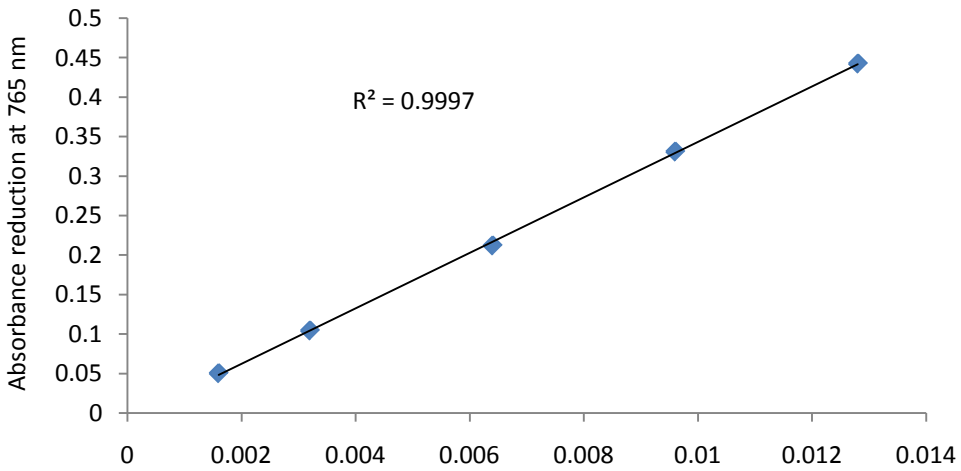

Figure 7 : Gallic acid standard curve for TPC

Determination of Total Flavonoid Content : Total flavonoid content was determined by using the colorimetric method of Sahreen and khan[19] with slight modification. 50mg of sample was dissolved in10 ml of 80% aqueous methanol and filtered through Whatman filter paperNo.42 (125mm). In a 10mL test tube, 0.3ml of extract, 3.4 mL of 30% methanol, 0.15 mL of 0.5M sodium nitrite, and 0.15 mL of 0.3 M aluminium chloride hexahydrate were added and mixed. After 5 minutes, 1mL of 1M sodium hydroxide was added. The absorbance of the mixture was measured at 510 nm using UV-Vis spectrophotometer (Lamda-25, Perkin Elmer Cambridge, UK) and values were express as Rutin equivalent antioxidant capacity. Linear calibration curves were produced with R^2=0.9996 **(Fig.8)**.

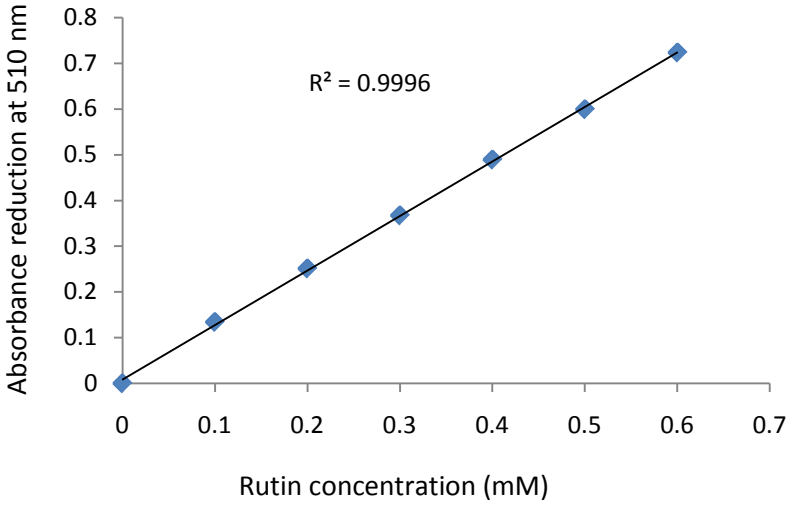

Figure 8 : Rutin standard curve for flavonoid content

Statistical Analysis : All the assays were carried out in triplicate and the experimental results obtained were expressed as mean SD.

III. Results and Discussion

DPPH Assay : DPPH assay is one of the methods used to determine the antioxidant potential of plant extract[20]. DPPH method is based on decrease in purple/dark violet colour of alcoholic DPPH solution[21, 22] when contracted with antioxidant substances like phenolic compounds and have a strong absorption range at 517 nm [23]. The DPPH Assay of *Solanumkurzii* berry is calculated to 257.74 μM/g±2.14.

ABTS : The pre-formed radical cation of 2, 2'-azinobis-(3-ethylbenzothiazoline-6-sulfonic acid) (ABTS*+) is generated by oxidation of ABTS with potassium persulfate and is reduced in the presence of such hydrogen-donating antioxidants[17] , the ABTS assay of the shoot of *Solanumkurzii* was evaluated to 30.75 ±2.14 μM/g.

Total Phenolic Content (TPC) : Phenolic content of plant act as primary antioxidants or free radical scavenger[21]. Significant correlations have been reported with phenolic content and antioxidant activity[22].TPC measured by FolinCiocalteu's method was calculated by plotting Gallic acid standard curve. TPC in mg GAE/g was found as 14.6±4.25.

Total Flavonoid Content (TFC) : Flavonoids are class of secondary metabolites with significant antioxidant and chelating properties. Antioxidant activity of flavonoid depends on the structure and substitution pattern of hydroxyl groups[23, 24, and 25]. The flavonoid content is determined by method by using Aluminium chloride colorimetric assay, 89.00 μMRE/g±2.31 flavonoid content was found.

Table 1 : TPC, TFC, ABTS and DPPH values of the methanolic extract of the *Solanumkurzii* berry

Sample	TPC(mg GAE/g)	TFC (μMRE/g)	ABTS (μM/g)	DPPH (μM/g)
*Solanumkurzii*berry	14.60	89.00	30.70	257.74

IV. Conclusion

The Solanumkurziiberry is highly consumed folk medicinal food among the indigenous people of Arunachal Pradesh. The seedling is seen to grow naturally when jungle is clear and burnt for jhum cultivation, the germination is expected to related with the burnt soil or need high temperature as the plant is not commonly seen grow wild either. The need of further scientific investigation of the plant on germination

,pharmacognosy, phytochemical and proximate is felt. The berry contains considerable phenolic and flavonoid compounds with considerable antioxidants activities.

V. Acknowledgements

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Comparative Analysis of Adverse drug Reactions in Directly Observed Treatment Short Course (DOTS) in TB Patients

By Md. Motiur Rahman, Ahmedullah Mishuk, Shimul Halder & Abul Kalam Lutful Kabir

Faculty of Pharmacy Univer, Bangladesh

Abstract- This study describes the occurrences of adverse drug reactions (ADRs) caused by anti tubercular (TB) drugs employed in Directly Observed Treatment Short Course (DOTS) from ten years of ADR data (from 2002 to 2012) reported in various articles. The frequency of each type of ADR was analyzed and compared. A total of 10,219 patients were studied. Among them, 8,047 (78.75%) patients demonstrated positive responses to at least one type of ADR. Dermatological reactions predominated among the ADRs which occurred in 4389 (42.95%) patients followed by hepatotoxicity in 1634 (15.99%) cases. Female patients were more prone to ADRs as compared to the male patients. The occurrence of ADRs is mainly attributed to the combination therapy along with the prolonged medication period. A colossal amount of ADRs were observed during the study which must be monitored and managed properly throughout the DOTS therapy in order to prevent life-threatening harmful effects.

Keywords: *tuberculosis, adverse drug reactions, dots.*

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Keywords: tuberculosis, adverse drug reactions, dots.

I. Introduction

Geographically, the burden of TB is highest in Asia and Africa. India and China together account for almost 40% of the world's TB cases (WHO, 2012). TB is a highly infectious disease caused by Mycobacterium tuberculosis, which is the second leading cause of death due to infection in the world. TB is a major public health problem in Bangladesh. The country ranks 6th on the list of 22 highest burden TB countries in the world. Each hour eight persons die of the disease for which very effective treatment, free of cost, is available in Bangladesh. Before 1993 TB control was limited to TB clinics and TB hospitals. Field implementation of TB control integrated into the general health services, delivered by Upazila Health Complexes (UHC's), started back in 80s. However, National TB Control Programme (NTP) Bangladesh revised its strategies and adopted DOTS in 1993. NGO's have been involved since 1994 (NTP).

The overall goal of the NTP is to reduce morbidity, mortality and transmission of TB until the disease is no longer a public health problem. The objectives are to detect 70% of new smear-positive pulmonary TB cases and cure at least 85 % of them by the year 2005 and be maintained thereafter to reach the Millennium Development Goal (MDG) by 2015 (NTP).

As the treatment of TB almost always involves combinations of drugs that are to be taken for a prolonged period of time, the occurrence of ADR is quite likely. Moreover, the adverse effect of one drug may be enhanced by the associated drug used which is one of the major reasons for the faulty patient treatment.

The common ADRs observed in DOTS involved mild gastritis, central nervous system, peripheral nervous system, psychiatric, dermatologic, musculoskeletal, renal, otologic, and ocular complications along with hypothyroidism, hepatitis, icterus, fever, and breathlessness (J. J. Furin et al., 2001; K. D. Tripathi, 2008; Rang & Dale, 2007).

Thus, a comprehensive understanding of the various ADRs along with their management is mandatory for the prevision, detection, and effectual TB management. It has become quite imperative to monitor the ADRs of patients on DOTS through the monitoring of ADRs and hence, the current study was undertaken.

II. Materials and Methos

Ten years ADR data (from 2002 to 2012) in the DOTS therapy caused by anti-TB drugs previously reported in various articles were searched from referred sources and observed carefully. The observed cases of different regions are listed in Table 1.

III. Results and Discussion

A total of 10219 patients were observed from previously studied articles. Among them 8047 (78.75%) patients showed at least one type of ADR. Dermatological ADRs were predominant (42.95%) which was followed by hepatotoxic reactions (15.99%). Different types of ADRs and there prevalence occuraence is depicted in Table 2 and Figure1.

The study says that, Isoniazid, rifampicin, and ethambutol are the drugs responsible for the skin reactions (F. Kurniawati et al., 2012). Arthralgia or gout which is prevalent in adults is mainly caused by isoniazid, ethambutol, and pyrazinamide that can be managed by Nonsteroidal Anti- inflammatory Drugs

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(NSAIDs). Children are less prone to hepatitis as compared to adults, mainly shown by pyrazinamide alone, isoniazid and rifampicin, isoniazid alone, and rifampicin alone. It can be reduced by starting therapy with ethambutol and pyrazinamide (F. Kurniawati et al., 2012).

The occurrence of ADRs among the female patients was marginally higher as compared to the male patients.This phenomenon is attributed to the alteration of drug responses mainly due to their lower body weight compared to the males. Different phases of life such as, pregnancy, menstruation cycles etc. also contribute to some extent in this regard (J J Furin et al., 2001; D.K.Tak et al., 2009).

ADR management should involve proper monitoring of the adverse reactions, postponing medication regimens, continuing the medication again without change and finally changing patient's treatment regimens. To reduce GI disorders antiemetic drugs and to alleviate dermatological reactions antihistamines can be administered as add on therapies.

IV. Conclusion

The occurrence of ADRs in the patients with DOTS is highly alarming; and immediate measures should be taken for the prevention of this phenomenon in order to minimize the potential serious health hazards including death. Pharmacists can play a significant role in the management of ADRs through patient counseling and improving their awareness.

V. Acknowledgement

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Table 1 : Number of Patients Observed of Different Regions (F. Kurniawati et al., 2012; Begum L. Nahar et al., 2006; A. K. Chhetri et al., 2008; K Gholami et al., 2006; PV Kishore et al., 2008; J. I. Jeong et al., 2009; Pillai, 2008).

	Region	Country	No. of Patients
1	Sylhet Chest Disease Hospital and Sylhet Shaheed Shamsuddin Ahmed Hospital	Bangladesh	64
2	New Delhi	India	185
3	Department at Imam tertiary teaching hospital	Iran	83
4	Gangneung	Korea	57
5	Penag	Malaysia	653
6	Manipal Teaching Hospital, Pokhara	Nepal	326
7	Pokhara	Nepal	137
8	Thailand	Thailand.	8,714
Total			10,219

Table 2 : Different Types of ADRs Observed (F. Kurniawati et al., 2012; Begum L. Nahar et al., 2006; A. K. Chhetri et al., 2008; K Gholami et al., 2006; PV Kishore et al., 2008; J. I. Jeong et al., 2009; Pillai, 2008).

Si. No.	Different ADRs	No. of Patients	Percentage
	Total no. of patients observed	10,219	100.00
1	Dermatological	4,389	42.95
2	Hepatitis	1,634	15.99
3	GI disturbance	1,004	9.82
4	Musculoskeletal	166	1.62
5	Central nervous system	86	0.84
6	Headache	37	0.36
7	Ocular	29	0.28
8	Fever	13	0.13
9	Otological	9	0.09
10	Peripheral nervous system	7	0.07
11	Renal	7	0.07
12	Breathlessness	4	0.04
13	Psychiatric	3	0.03
14	Miscellaneous	659	6.45
Total no. of ADRs observed		8,047	78.75

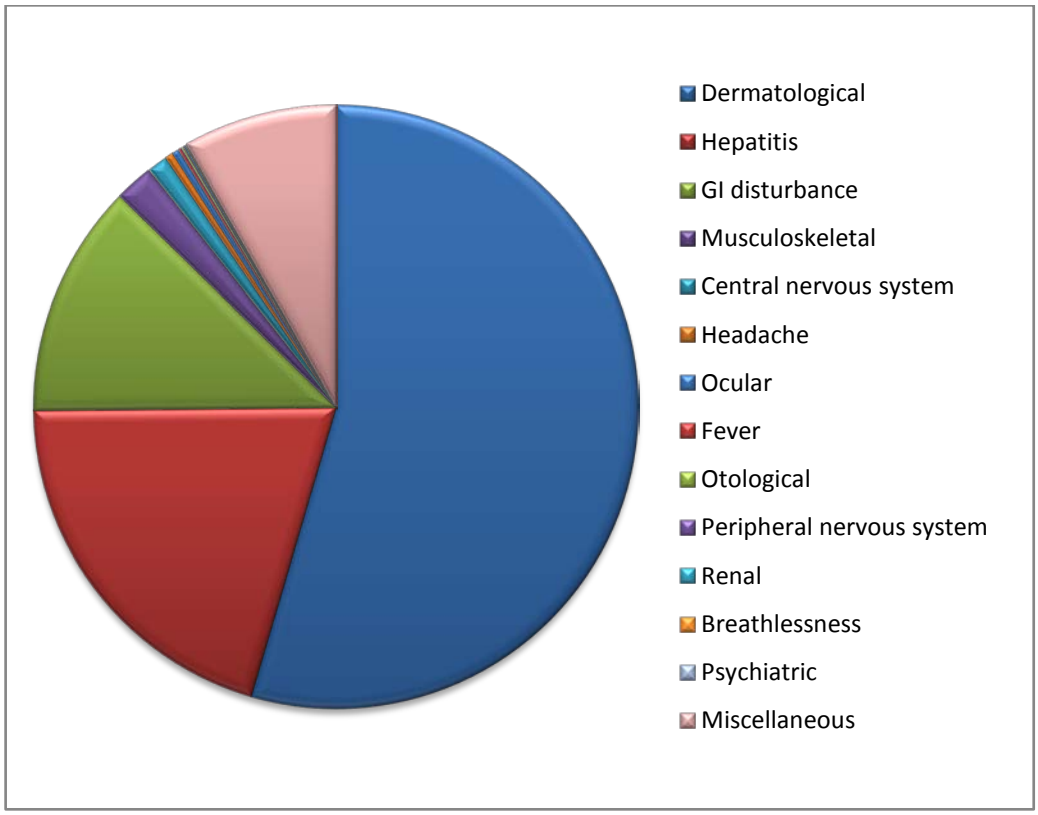

Figure 1: ADR percentages in DOTS

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Chemistry, Pharmacology and Medicinal Property of Saffron as A Viable Agent in the Treatment of Prostate, Pancreatic or Other Types of Cancer

By Rafie Hamidpour, Soheila Hamidpour, Mohsen Hamidpour & Mina Shahlari

Abstract- Saffron is known as the majestic functional Natural Medicine, Saffron Extract is considered important for drug development, because they are reported to have Pharmacological activity in the Asia, Middle East especially China, Spain and India. For a long time Saffron has been used in traditional medicine for the relief of pain changing the mood and its use in cancer treatments, Saffron comes from the dried red stigmas of the Crocus sativus L. flower. Along with its use in cooking and in traditional medicine, it has numerous applications as an antitoxic, anti-oxidant, and anti-cancer agent, due to its secondary metabolites and their derivatives (safranal, crocins, crocetin, dymethylcrocetin). Data from this study will demonstrate that Crocus sativus extract (CSE) and its major constituents, crocin and crocetin significantly inhibited the growth of certain cancer cells while not effecting normal cells. Crocus sativus L. extract should be investigated further as a viable agent in the treatment of prostate, pancreatic or other types of cancer. This article presents comprehensive analysis information on botanical, chemical and Pharmacological aspect of Saffron.

Keywords: chemistry, pharmacology and medicinal property of saffron, crocus sativus l., components, traditional medicine, tumor inhibitor.

GJMR-B Classification : NLMC Code: QV766, WB330

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Rafie Hamidpour [α], Soheila Hamidpour [σ], Mohsen Hamidpour [ρ] & Mina Shahlari [ω]

Abstract- Saffron is known as the majestic functional Natural Medicine, Saffron Extract is considered important for drug development, because they are reported to have Pharmacological activity in the Asia, Middle East especially China, Spain and India. For a long time Saffron has been used in traditional medicine for the relief of pain changing the mood and its use in cancer treatments, Saffron comes from the dried red stigmas of the Crocus sativus L. flower. Along with its use in cooking and in traditional medicine, it has numerous applications as an antitoxic, anti-oxidant, and anti-cancer agent, due to its secondary metabolites and their derivatives (safranal, crocins, crocetin, dymethylcrocetin). Data from this study will demonstrate that Crocus sativus extract (CSE) and its major constituents, crocin and crocetin significantly inhibited the growth of certain cancer cells while not effecting normal cells. Crocus sativus L. extract should be investigated further as a viable agent in the treatment of prostate, pancreatic or other types of cancer. This article presents comprehensive analysis information on botanical, chemical and Pharmacological aspect of Saffron.

Keywords: chemistry, pharmacology and medicinal property of saffron, crocus sativus l., components, traditional medicine, tumor inhibitor.

I. Introduction

Saffron is one of the most expensive spices in the world, derived from the dry stigmata of Crocus sativus L., a member of the Iridaceae (Iris) family (Peter, 2000). Saffron is hand-harvested during the flowering season. This process is very time consuming which involves picking the stigmata by hand and then carefully drying the stigmata to produce a quality product (Peter, 2000). One stigma of saffron weighs about 2 mg and each flower has three stigmata. In order to obtain 1 kg of spice, 150,000 flowers must be carefully picked (Peter, 2000). Saffron (Crocus sativus L.) is mostly cultivated in Spain, Iran, India, Greece, China and some other European and Asian countries (Peter, 2000). The quality and chemical composition of saffron are affected by the region in which saffron is grown (Peter, 2000), the drying process, the conditions of packaging, storage of saffron, and the analytical extraction methods which have been used (Caballero-Ortega et al., 2007).

The nutritional supplement value of Saffron (Crocus sativus L.) which was provided by Pars Bioscience LLC in powder form, to Covance, Madison. WI laboratory was analyzed and shown to include the following contents: NL-Proximate (moisture, ash, protein, fat, total carbohydrates, calories, and calories from fat), results of these analyses are detailed (Table 1). Vitamins (vitamin A, C, and folic acid), and minerals (calcium, copper, iron, magnesium, manganese, phosphorus, potassium, sodium, and zinc), are detailed in (Table 2). The results of analysis of saffron fatty acid profile are detailed in (Table 3).

Also to identify the major components of Saffron, the analysis of the saffron was conducted by grinding and extracting saffron, and analyzing the extract using HPLC/UV-MS analysis by Pars Bioscience which is shown in (Figure 1).

To date, the following components have been identified in saffron: safranal which is the principal substance responsible for the aroma of saffron, dimethylcrocetin, crocetin esters (cis-crocetin, and trans crocetin), picrocrocin is the substance responsible for bitter taste of saffron (Peter, 2000), crocin which are the major components responsible for the color of saffron, trans-crocin-2, trans-crocin-2', trans-crocin-3, trans crocin-4, cis-crocin-1, cis-crocin-2, cis-crocin-3, cis-crocin-4, cis-crocin-5, anthocyanin, carotene, and lycopene (Peter, 2000; Caballero-Ortega et al., 2007; Aung et al., 2007; Kanakis et al, 2007; Sanchez et al., 2008; Chryssanthi et al., 2007; Hosseinzadeh and Sadeghnia, 2007).

The main uses of saffron are in cooking, food coloring, in perfume and Cosmetics (Peter, 2000;

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Abdullaev, 2002). Saffron has also traditionally been regarded as a highly valued medicinal plant to treat wide variety of ailments such as depression, respiratory problems, colds, asthma, and heart diseases. (Abdullaev and Espinosa-Aguirre, 2004). More recently, as the current culture has been changing, more researches have been done analyzing the effects of traditional herbs and spices as treatment for the severe diseases (Abdullaev, 2002).

Several studies have been performed on the use of saffron or it's constituents in the treatment of a variety of cancers including colorectal cancer cells (HCT-116, SW-480, and HT-29) , non-small cell lung cancer (NSCLC) cells (Aung et al., 2007) , breast cancer cells (MCF-7 and MDA-MB-231) (Chryssanthi et al., 2007) , lung adenocarcinoma cells (A549), lung fibroblasts cells (WI-38), VA-13 cells (WI-38 cells transformed in vitro by SV40 tumor virus) (Abdullaev and Espinosa-Aguirre, 2004; Abdullaev and Frenkel, 1992; Surh et al., 2005) , lung cancer-bearing mice (Magesh et al., 2006), skin carcinogenesis in mice (Salomi et al.,1991; Konoshima et al.,1998), leukemia cells (HL-60), osteosarcoma, fibrosarcoma (Aung et al., 2007; Kanakis et al, 2007), ovarian carcinoma (Aung et al, 2007; Abdullaev, Espinosa-Aguirre, 2004), and cervical epithelioid carcinoma cells (HeLa) (Abdullaev and Espinosa-Aguirre, 2004; Surh et al., 2005; Escribano et al.,1996). Saffron significantly inhibited the growth of colorectal cancer cells while not affecting normal cells (Aung et al., 2007). Saffron showed a dose-dependent inhibitory response on breast cancer cells (Chryssanthi et al., 2007). Crocetin inhibited the three malignant human cell lines (HeLa, A549, and VA13) (Surh et al., 2005). Overall, saffron inhibits tumor growth in vivo and in vitro and could be used for the treatment of cancer, either alone or in combination with other treatments (Hosseinzadeh and Sadeghnia, 2007; Schmidt et al., 2007).

FIGURES AND TABELS

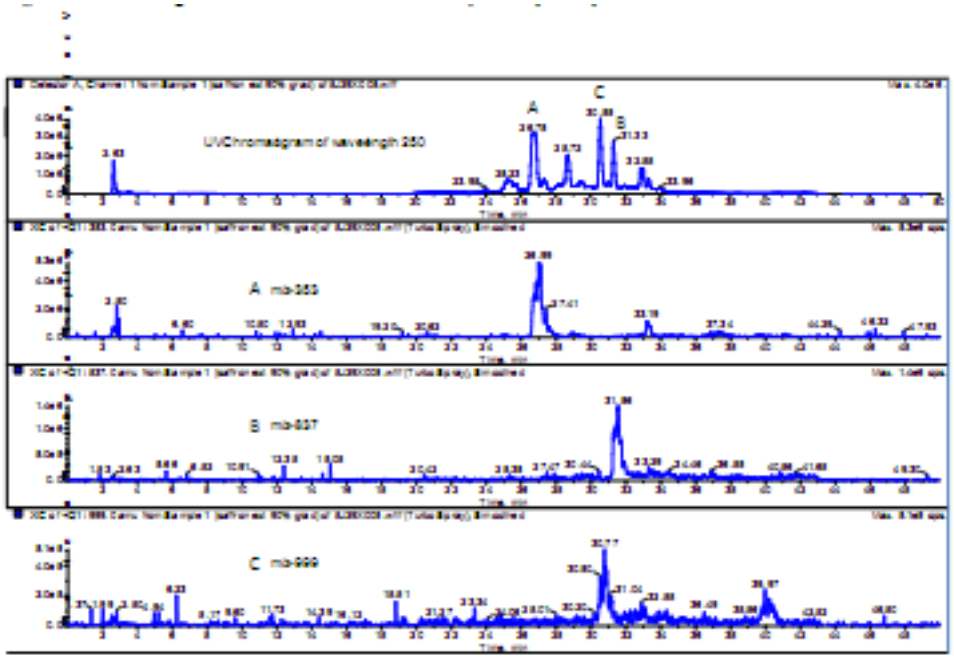


Figure 1 : Chromatogram of the Crocus sativus L. sample analyzed by UV at 250 nm.

Figure 2 : *C. sativus* blossom threads, With crimson stigmas

Figure 3 : C. sativus.

Figure 4 : Valuable stigmas, or are tediously plucked, piled, and dried

Table 1 : Nutritional Supplement (NL-Proximate) Analysis of Saffron

Analysis	Results (per 100 g serving size)
Moisture	7.7 g
Ash	4.6 g
Protein	15.6 g
Fat	5.5 g
Total Carbohydrates	69.6 g
Calories	363 Cal
Calories from Fat	22.1 Cal

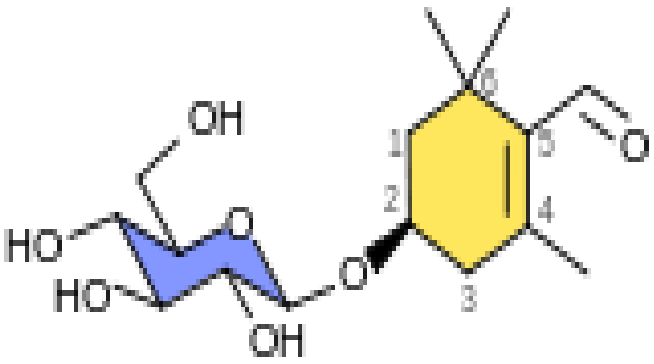
Table 2 : Nutritional Vitamins and minerals of Saffron

Vitamins	
Vitamin A	< 100 IU
Vitamin C	< 1.0 mg
Folic Acid	800 mcg
Minerals	-
Calcium	124 mg
Copper	0.908 mg
Iron	23.7 mg
Magnesium	154 mg
Manganese	2.44 mg
Phosphorus	404 mg
Potassium	1750 mg
Sodium	39.0 mg
Zinc	4.15 mg

Table 3 : Nutritional Fatty acids of Saffron

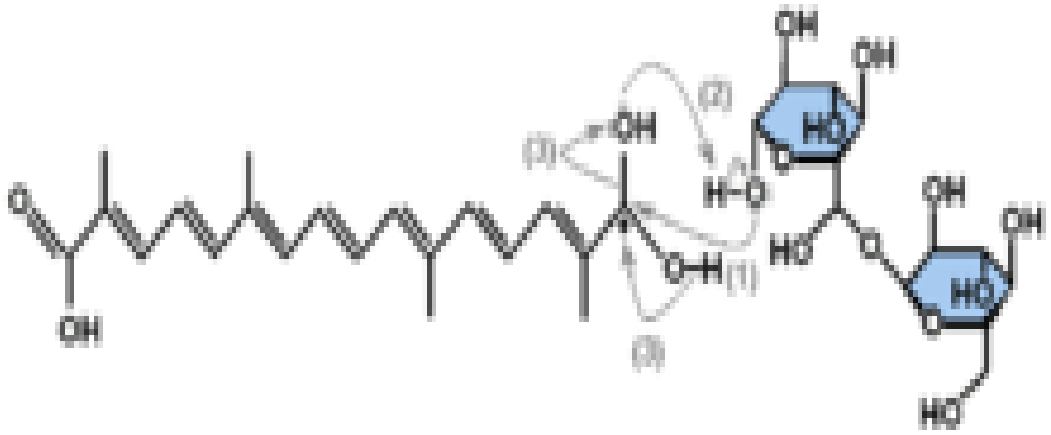
Analysis	Results (per 100 g serving size)
8:0 Caprylic	< 0.003 g
10:0 Capric	< 0.003 g
12:0 Lauric	0.011 g
14:0 Myristic	0.012 g
14:1 Myristoleic	< 0.003 g
15:0 Pentadecanoic	0.003 g
15:1 Pentadecenoic	< 0.003 g
16:0 Palmitic	0.425 g
16:1 Palmitoleic	0.008 g
17:0 Heptadecanoic	0.006 g
17:1 Heptadecenoic	< 0.003 g
18:0 Stearic	0.030 g
18:1 Oleic	0.314 g
18:2 Linoleic	1.20 g
18:3 Gamma Linolenic	< 0.003 g
18:3 Linolenic	0.394 g
20:0 Arachidic	< 0.003 g
20:1 Eicosenoic	0.012 g
20:2 Eicosadienoic	0.036 g
20:3 Eicosatrienoic	< 0.003 g
20:4 Arachidonic	< 0.003 g
22:0 Behenic	0.008 g
Saturated Fat	0.471 g
Monounsaturated Fat	0.321 g
Polyunsaturated Fat	1.56 g
Sum of Fatty Acids	2.46 g

Chemistry and Chemical Composition



Structure of picrocrocin (Surh et al., 2005) : β–D-glucopyranose derivative

The commonly known Saffron contains more than 150 volatile and aroma-yielding compounds. It also has many nonvolatile active components (Surh et al., 2005), many of which are carotenoids, including zeaxanthin, lycopene, and various α- and β-carotenes. However, saffron's golden yellow-orange color is primarily the result of α-crocin. This crocin is trans-crocetin di-(β-D-gentiobiosyl) ester; it bears the systematic (IUPAC) name 8, 8-diapo-8, 8-carotenoic acid. This means that the crocin underlying saffron's aroma is a digentiobiose ester of the carotenoid crocetin (Schmidt et al., 2007). Crocins themselves are a series of hydrophilic carotenoids that are either monoglycosyl or diglycosyl polyene esters of crocetin (Escribano et al., 1996). Crocetin is a conjugated polyene dicarboxylic acid that is hydrophobic, and thus oil-soluble. When crocetin is esterifies with two water-soluble gentio-bioses, which are sugars, a product results that is it water-soluble. The resultant α-crocin is a carotenoid pigment that may comprise more than 10% of dry saffron's mass. The two esterifies gentiobioses make α-crocin ideal for coloring water-based and non-fatty foods such as rice dishes (Schmidt et al., 2007).



Esterification reaction between crocetin and gentiobiose. Components of α–crocin:

β–D-gentiobiose crocetin

The bitter glucoside picrocrocin is responsible for saffron's flavor. Picrocrocin (chemical formula: C16H26O7; systematic name: 4-(β-D-glucopy-ranosyloxy)-2, 6, 6- trimethylcyclohex-1-ene-1-carbox-aldehyde) is a union of an aldehyde sub-element known as safranal (systematic name: 2, 6, 6-trimethyl-cyclohexa-1, 3-diene-1-carboxaldehyde) and a carbo-hydrate. It has insecticidal and pesticide properties, and may comprise up to 4% of dry saffron. Picrocrocin is a truncated version of the carotenoid zeaxanthin that is produced via oxidative cleavage, and is the glycoside of the terrene aldehyde safranal. The reddish-colored zeaxanthin is, incidentally, one of the carotenoids naturally present within the retina of the human eye (Schmidt et al., 2007).

When saffron is dried after its harvest, the heat, combined with enzymatic action, splits picrocrocin to yield D–glucose and a free safranal molecule (Surh et al., 2005). Safranal, a volatile oil, gives saffron much of its distinctive aroma (Escribano et al., 1996; Schmidt et al., 2007). Safranal is less bitter than picrocrocin and may comprise up to 70% of dry saffron's volatile fraction in some samples (Escribano et al.,1996). A second element underlying saffron's aroma is 2-hydroxy-4, 4, 6-trimethyl-2, 5-cyclohexadien-1-one, the scent of which has been described as "saffron, dried hay like". Chemists found this to be the most powerful contributor to saffron's fragrance despite its being present in a lesser quantity than safranal (Escribano et al., 1996). Dry saffron is highly sensitive to fluctuating pH levels, and rapidly breaks down chemically in the presence of light and oxidizing agents. It must therefore be stored away in air-tight containers in order to minimize contact with atmospheric oxygen. Saffron is somewhat more resistant to heat.

II. Discussion

Saffron is a very valuable spice with many traditional medicinal usages. The high amount of carotenoids in saffron including crocin, crocetin and dimethylcrocetin are responsible for some biological functions of saffron. Most of the studies on the effect of saffron, indicates the significant inhibitory effects of the Crocus sativus components on the synthesis of nucleic acids in different human cancer cell lines (Afshari et al., 2005).

As the studies have shown, diets rich in antioxidants will lower the risk of several chronic

diseases and protect the body against the development and growth of tumor cells. Therefore, Saffron and it's constituents with their antioxidant properties can act as a protecting agent for the prevention of some serious diseases like cancer (Premkumar et al., 2006).

Crocus sativus L. extract (CSE) used in several studies were prepared from stigmas of Crocus sativus. Crocus sativus L. contains several pharmacologically active constituents. Saffron has antioxidant properties; these have been showed in humans, where saffron (50 mg, twice a day) decreases the lipoprotein oxidation susceptibility (Verma and Bordia, 1998). Also crude methanol extract of saffron and its compound crocin have been exhibited high antioxidant and scavenging properties (Assimopoulou et al., 2005).

The oral administration of the saffron ethanolic extract (200 mg/kg body wt) increased the life span of Swiss albino mice intraperitoneally transplanted with sarcoma-180 (S-180) cells, Ehrlich ascites carcinoma (EAC) or Dalton's lymphoma ascites (DLA) tumors (Nair et al., 1991), and it has an inhibitory effect on chemical carcinogenesis in mice using two stage assay system (Salomi et al., 1991).

Crocetin protects body against free radicals and the studies have shown its role as an antitumor agent (Magesh et al., 2006).

The effect of crocetin on two different types of animal tumors, Skin papillomas and Rous sarcoma have been studied and shown that crocetin decreased the number of tumor cells and delayed the onset of the tumors as well (Grainer et al.,1976). A recent study showed that crocetin (20 mg/kg) reverted the level of lipid peroxidation induced by Benzo (a) pyrene B (a) b, also increased the activities of the enzymic antioxidants and glutathione metabolizing enzymes. Showing that crocetin is a scavenger of free radicals and a potent antitumor agent (Magesh et al., 2006).

Crocin inhibits the growth of HeLa cells and suggested apoptosis induction and showed important inhibitory effects on skin-tumor initiation and promotion induced by 7, 12-dimethylbenz[a] anthracene (DMBA) and 12-0-tetradecanoylphorbol-13-acetate (TPA), respectively (Escribano et al., 1996).

Many studies during the last decade, demonstrated the inhibitory effect of saffron and its components in vitro, on several cancer types like carcinoma, leukemia, prostate, pancreatic, and several other tumor cells (Jafarova et al., 2006).

III. Toxicity of Saffron

There are no reports of negative side effects as far we know associated with Saffron despite of their usages for many centuries. The toxicity of saffron has been studied by many researchers and the levels of toxicity found to be very low. The studies showed that the concentration of 0 to 5gr/kg was non-toxic to mice (Chryssanthi et al., 2007). Also hematological and biochemical studies on the toxicity of saffron extract indicates that there are no severe toxicological sign found in kidney, liver or bladder within the normal range of use (Nair et al., 1991).

IV. Conclusion

The objective of this paper has been the recent advance in the exploration of saffron as phytotherapy and to illustrate its potential as a therapeutic agent. Saffron may represent natural, safe and effective treatments for many diseases and their symptoms. In recent decades, with the increase of pharmacological knowledge about the beneficial effects of saffron especially three major component that we analysis and identify in Figure 1, these herbal medicines with anti-bacterial, anti-oxidant, anti-inflammatory, free radical scavenging and anti-tumor activities, have found to be very effective in the development of novel natural drugs to prevent, control and treat many minor health problems as well as more serious and complicated diseases such as diabetes, Alzheimer's and cancer. It must be kept in mind that clinicians should remain cautious until more definite studies demonstrate the safety, quality and efficacy of saffron and saffron component. For these reasons, extensive pharmacological and chemical experiments, together with human metabolism should be focus of our next studies and further potential of saffron to be employed in new therapeutic drugs and provide a basis for future research on the application of medicinal plants.

Author's Contributions

Rafie Hamidpour
Group1 : Conception and design, Analysis and

interpretation of data
Group 2 : Critical revision of the article
Group 3 : Final approval of the version to be published

Soheila Hamidpour
Group1 : Analysis and interpretation of data
Group 2 : Critical revision of the article
Group 3 : Final approval of the version to be published

Mohsen Hamidpour
Group1 : Analysis and interpretation of data
Group 2 : Critical revision of the article
Group 3 : Final approval of the version to be published

Mina Shahlari
Group1 : Acquisition of data
Group 2 : Drafting the article
Group 3 : Final approval of the version to be published

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A Survey on Traditional Medicinal Plants used for the Treatment of Diabetes in Urban Areas of Dhaka and Khulna, Bangladesh

By Md. Motiur Rahman , Ahmedullah Mishuk, Shimul Halder & Abu Shara Shamsur Rouf

Abstract- Diabetes Mellitus (DM) is a metabolic disorder which is greatly prevalent in Bangladesh and the use of traditional medicinal plants for its treatment is also very popular. In this study, a survey to identify the medicinal plants used for the treatment of DM in the urban areas of Dhaka and Khulna, Bangladesh was conducted. In this survey, 100 randomly chosen individuals of both Dhaka and Khulna, 50 each, were interviewed in a structured manner, regarding the use of anti-diabetic medicinal plants. A total of 30 medicinal plants belonging to 18 families were accounted for the treatment of DM in Bangladesh. The most widely mentioned plants were, Coccinia indica (Telachuka), Azadirachta indica (Neem), Trigonella foenum-graecum (Methi), Syzygium cumini (Jam), Terminalia chebula (Horituki), Ficus racemosa (Joiggi dumur), Momordica charantia (Korolla), Swietenia mahagoni (Mahogany)., Phyllanthus emblica (Amloki), Terminalia bellirica (Bohera), Tinospora cordifolia (Gulancha lota), Lagerstroemia speciosa (Jarul), Withania somnifera (Aswagandha). Although a large number of traditional medicinal plants are being used for the treatment of DM in Bangladesh, extensive clinical intervention studies are essential prior to recommend their use to ensure proper public health outcomes.

Keywords: *diabetes mellitus, traditional medicinal plants, clinical intervention, bangladesh.*

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Md. Motiur Rahman [α], Ahmedullah Mishuk [σ], Shimul Halder [ρ] & Abu Shara Shamsur Rouf [ω]

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I. Introduction

Bangladesh is a country in South Asia, located on the fertile Bengal delta. It lies between latitudes 20° and 27°N, and longitudes 88° and 93°E. Bangladesh is in the low-lying Ganges Delta. The location of the country allows for the deposition of alluvial soil which has created some of the most fertile plains in the world. The fertile lands of Bangladesh boasted with tropical forests and boggy jungle along with the floral biodiversity made it an excellent source of medicinal plants.

Inexpensive and easily accessible nature of the traditional medicines made it an integral part of public health services in Bangladesh (Ashraf A et al., 1982, Ahmed SM et al., 2009, Rahman SA et al., 2012).

In Bangladesh, the use of traditional medicinal plants for the treatment of DM has not yet been studied in great detail. Hence, the research in this topic has become imperative as the prevalence of DM in Bangladesh is apparently irrupting. Although the prevalence of DM in urban areas is greater than in rural communities (Rahim MA et al., 2007, Bhowmik B et al., 2012), the rates for diabetes has increased from 2.3% to 6.8% in between 1999 to 2004 (Rahim MA et al., 2010).

It's a burning question now, whether the traditional Bangladeshi medicine provide a safe and effective alternative therapy for DM. In order to accost this question, a survey in urban areas of Dhaka and Khulna was conducted to identify the medicinal plants for the treatment of diabetes.

II. Materials and Methods

a) Study Design

The survey was carried on the Dhaka Municipal Corporation areas which has an area of around 300 square kilometers (km^2). According to the Bangladesh Bureau of Statistics, Dhaka metropolitan has a population of about 14.5 millions. The infrastructure and socio economic stature of the Dhaka city brings about continuous migration of new residents from all over Bangladesh, which contributes to a diverse background of dwellers.

The other part of the survey was conducted in the urban areas of Khulna district which has an area of 59.57 km^2 and a population of 1.44 millions. It possesses a rural environment with smaller towns as well as a lower population density as compared to the urban areas of Dhaka.

b) Data Collection

The objective of the study was to qualitatively identify traditional anti diabetic medicinal plants, accessible to the general people. Interviews of key informants were performed using a pre-defined questionnaire. A total of 100 interviews were conducted, of which 50 in the Dhaka city and 50 in the Khulna city. In this study, participants were divided into different informant groups and key informants were randomly chosen from these groups (see Table1). As a limited number of informants were participating in this study, quantitative conclusions are not practicable.

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Interviews were conducted in the Bengali language and grounded on a semi structured question form and the answers were recorded. For the publication of this report informed consent was obtained from the participants. In this study, questionnaire was projected to gather information on educational background and social status of the informant, general knowledge about diabetes, accession to allopathic medicine, and anti diabetic traditional medicinal plants used in the therapy. In this study, the overall usage rate (%) of the medicinal anti diabetic plants was assessed (see Table 2).

Each person participating in the survey was interviewed once and the cited medicinal plants were recorded in local names including photographs. The plants listed were dried out, preserved, and finally identified by a phytologist.

c) Data analysis

The usage rate for a plant species was calculated to assess the incidence of a particular plant species used for the treatment of diabetes. It was calculated as follow-Usage Rate (%) = (Number of quotation for a particular plant species/Number of all quotation for all species) *100.

III. Results and Discussion

A total of 100 interviews were conducted which divulged 30 different plants used for the treatment of diabetes alone or in combination with other plants. According to the survey, the top five plants used for the treatment of diabetes were, Coccinia indica (Telachuka), Azadirachta indica (Neem), Trigonella foenum-graecum (Methi), Syzygium cumini (Jam), and Terminalia chebula (Horituki). The usage rate of different anti-diabetic medicinal plants is shown in Figure 1.

The most frequently cited plants in Dhaka were, Trigonella foenum-graecum (Methi) and Momordica charantia (Korolla); whereas in Khulna, the most frequently cited plants were, Ficus benghalensis (Bot) and Tinospora cordifolia (Gulancha lota). The usage rate of top 13 most frequently mentioned anti-diabetic medicinal plants according to their locations is depicted in Figure 2. The study revealed that leaves, the whole plants, and seeds were most frequently used for the treatment of diabetes (Figure 3).

The survey revealed the use of 30 medicinal plants of 18 families for the treatment of diabetes in Bangladesh.

Coccinia indica (Telachuka) was the plant of choice in most of the cases both in Dhaka and Khulna for the treatment of diabetes. The hypoglycemic effects of Coccinia indica leaves have been reported in various animal (Venkateswaran S., 2003, Shibib BA et al., 1993, Hossain MZ et al., 1992, Kar A et al., 2003) and human trials (Khan AK, 1980, Kamble SM et al., 1998, Kuriyan R et al., 2008).

The usage rate of Trigonella foenum-graecum (Methi) is high in Dhaka city. An Anti-hyperglycemic compound- GII by name has been purified from the water extract of the seeds of Trigonella foenum-graecum showed reduced blood glucose in glucose tolerance test (GTT) in the sub-diabetic rabbits.(Moorthy R et al., 2010).

Momordica charantia (Korola) is a popular edible vegetables and its usage rate was also high in Dhaka as compared to Khulna. Streptozotocin induced diabetic rats were treated with aqueous extracts of Momordica charantia for a period of 30 days which resulted in a significant reduction in blood glucose, glycosylated hemoglobin, lactate dehydrogenase, glucose-6-phosphatase, fructose-1,6-bisphosphatase and glycogen phosphorylase, and a concomitant increase in the levels of hemoglobin, glycogen and activities of hexokinase and glycogen synthase (Sekar DS et al., 2005). The use of leaves, stem and seeds were also reported for the treatment of DM (Kadir MF et al., 2012).

The usage rate of Ficus racemosa (Joiggi dumur) is high in Khulna city. The glucose-lowering efficacy of methanol extract of the stem bark was evaluated both in normal and alloxan-induced diabetic rats at the doses of 200 and 400 mg/kg orally and the ethanol extract (250 mg/kg/day orally) lowered blood glucose level within 2 weeks in the alloxan diabetic albino rats confirming its hypoglycemic activity (Anita Rani Shiksharthi, 2011).

Tinospora cordifolia (Gulancha lota) is used highly in Khulna region. Oral administration of the aqueous root extract resulted in a significant reduction in blood glucose & brain lipids in alloxan induced diabetic rats (Patel Nidhi et al., 2013).

Azadirachta indica (Neem) is a common medicina plant in Bangladesh (Kadir MF et al.,2012). Hypoglycemic activity of the 90% ethanolic extract of this plant was studied and compared with that of a reference antidiabetic drug glimeperide in glucose loaded and alloxan induced diabetic rats. Result showed that ethanol leaves extract (1 gm/kg) significantly reduced the elevated blood glucose level by 36.91% in glucose loaded rats and 30.20% and in alloxan induced diabetic rats, respectively compared to the respective diabetic control group (Rasheda Akter et al., 2013).

Anti-diabetic activity has been reported for Terminalia chebula (Horituki). Oral administration of the ethanolic extracts of the fruits significantly reduced blood glucose level glycosylated hemoglobin in Streptozotocin induced diabetic rats (Gandhipuram Periasamy et al., 2006).

Syzygium cumini (Jam) significantly reduced blood sugar level in alloxan induced diabetic rats but in case of clinical trials, the extracts obtained from the leaves are pharmacologically inert (Shweta Sharma et al., 2012).

IV. Conclusion

The socioeconomic structure of Bangladesh allows for the use of a wide range of traditional medicinal plants for the treatment of ailments and our study revealed 30 medicinal plants for the treatment of Diabetes in Dhaka and Khulna, although their efficacy is questionable due to the lack of proper clinical trials.

It is, therefore, mandatory to conduct proper clinical trials to evaluate the safety, efficacy, and dose dependant relationship of the plants of interests to ensure better public health outcomes.

V. Acknowledgements

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Table 1 : Different Informant Groups with Sample

Informant group	No of persons		Gender		Age
	Dhaka	Khulna	Male	Female	
Diabetic patients	20	20	20	20	55(40–65)
Allopathic doctors	10	10	10	10	48 (35–50)
Traditional healers (Kabiraj)	5	5	8	2	60 (45–70)
Native doctors [a]	9	9	10	8	43 (35-60)
Representatives of local medicine companies	6	6	10	2	40 (25–55)
Total	50	50	58	42	

a = Doctors passed from Unani and Ayurvedic Medical Colleges and hospitals;

Table 2 : List of Traditional Medicinal Plants Used for the Treatment of Diabetes in Bangladesh and their Usage Rate

Si. No	Botanical name	Family	Local Name	Plant parts used	When Used	Usage Rate (%)
1	*Coccinia indica W.&A.*	Cucurbitaceae	Telachuka	Fruit, leaf, root, whole plant	M, F, Pm	17.2
2	*Azadirachta indica A. Juss.*	Meliaceae	Neem	Bark, leaf, seed	M, F	9.45
3	*Trigonella foenum-graecum L.*	Fabaceae	Methi	Seed, whole plant	M, F	8.45
4	*Syzygium cumini (L.) Skeels*	Myrtaceae	Jam	Leaf, seed	M, F	7.88
5	*Terminalia chebula Retz.*	Combretaceae	Horituki	Seed	M, F	6.18
6	*Ficus racemosa L.*	Moraceae	Joiggi dumur	Bark, fruit	M, Pm	5.05
7	*Momordica charantia L.*	Cucurbitaceae	Korola	Fruit, leaf, whole plant	M, F	4.24
8	*Swietenia mahagoni Jacq.*	Meliaceae	Mahogany	Seed	M, F	4.24
9	*Phyllanthus emblica L.*	Phyllanthaceae	Amloki	Fruit, seed, whole plant	M, F	3.59
10	*Terminalia bellirica L.*	Combretaceae	Bohera	Seed	M, F	3.55
11	*Tinospora cordifolia Hook. F. & Thoms.*	Menispermaceae	Gulancha lota	Bark, leaf, root, whole plant	M	3.39
12	*Lagerstroemia speciosa (L.) Pers.*	Lythraceae	Jarul	Leaf	M	3.24
13	*Withania somnifera (L.) Dunal*	Solanaceae	Aswagandha	Leaf, root, whole plant	M, F	2.64
14	*Allium sativum L.*	Amaryllidaceae	Rosun	Root, whole plant	M	1.88
15	*Asparagus racemosus L.*	Asparagaceae	Sotomuli	Root	M, F	1.79

16	*Bunium persicum Bois.*	Apiaceae	Kalo Jeera	Seed, whole plant	M	1.69
17	*Cynodon dactylon (L.) Pers.*	Poaceae	Durba	Leaf, whole plant	M, F	1.69
18	*Ficus benghalensis L.*	Moraceae	Bot	Leaf	M, F	1.69
19	*Tamarindus indica L.*	Fabaceae	Tetul	Seed	M	1.69
20	*Andrographis paniculata Wall. ex Nees*	Acanthaceae	Kalmegh	Leaf, whole plant	M	1.24
21	*Centella asiatica L.*	Apiaceae	Thankuni	Leaf	M	1.18
22	*Datura stramonium L.*	Solanaceae	Dhotura	Seed	M	1.08
23	*Eclipta alba L.*	Asteraceae	Kalokeshi	Leaf	M	0.92
24	*Mimosa pudica L.*	Fabaceae	Lojjaboti	Whole plant	M	0.89
25	*Ocimum sanctum L.*	Lamiaceae	Kalo Tulshi	Whole plant	M, F	0.89
26	*Swertia chirata L.*	Gentianaceae	Chirota	Root	-	0.89
27	*Terminalia arjuna W.&A.*	Combretaceae	Arjun	Seed	M	0.85
28	*Vernonia anthelmintica Willd.*	Asteraceae	Somraj	Whole plant	M	0.85
29	*Vinca rosea L.*	Apocynaceae	Noyontara	Leaf	F	0.84
30	*Vitex negundo L.*	Lamiaceae	Nishinda	Leaf	M	0.84

Plants listed according to the hierarchy of usage rate, with plant parts used; stage of maturity of plants at the time of use (M= mature, F = fresh, Pm = premature).

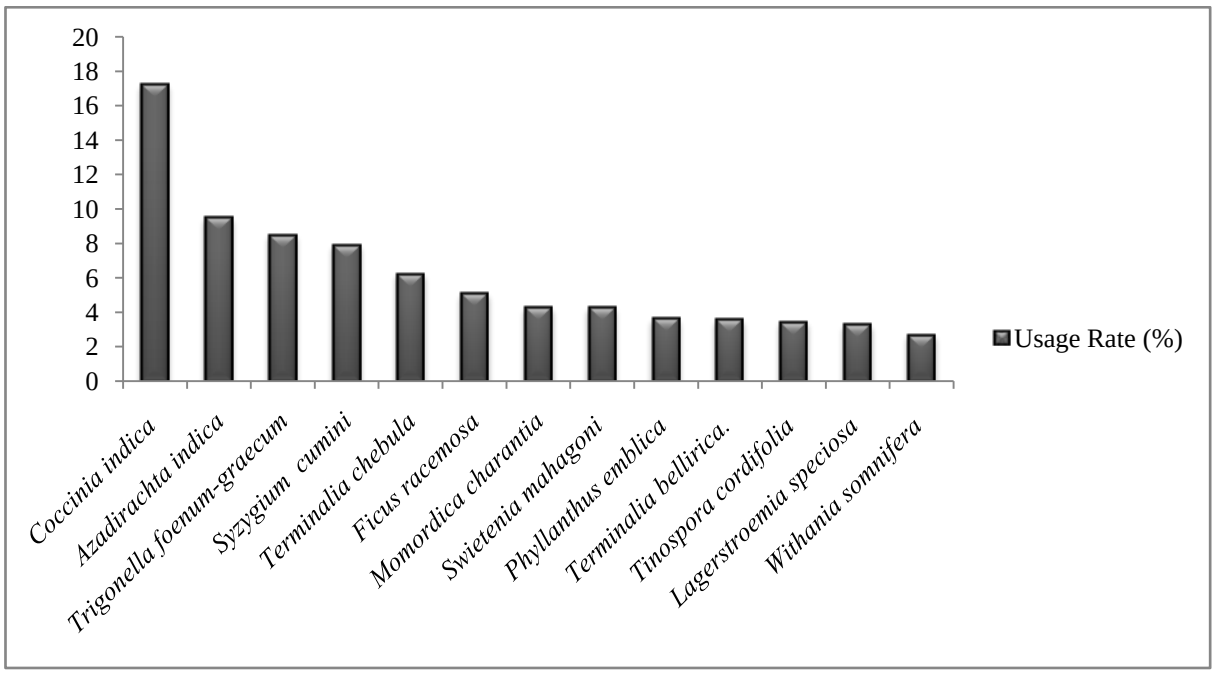

Figure 1 : Usage rate of different anti-diabetic medicinal plants (top 13)

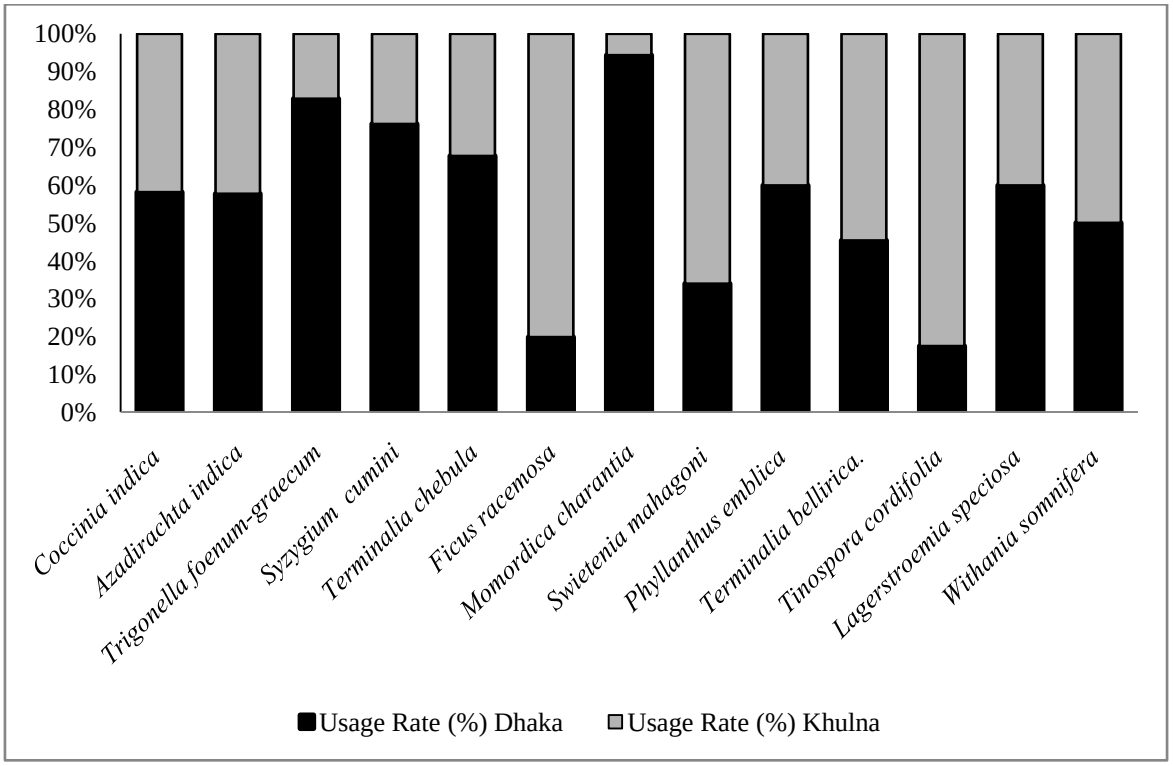

Figure 2 : Distribution of the top 13 most frequently mentioned anti-diabetic plants

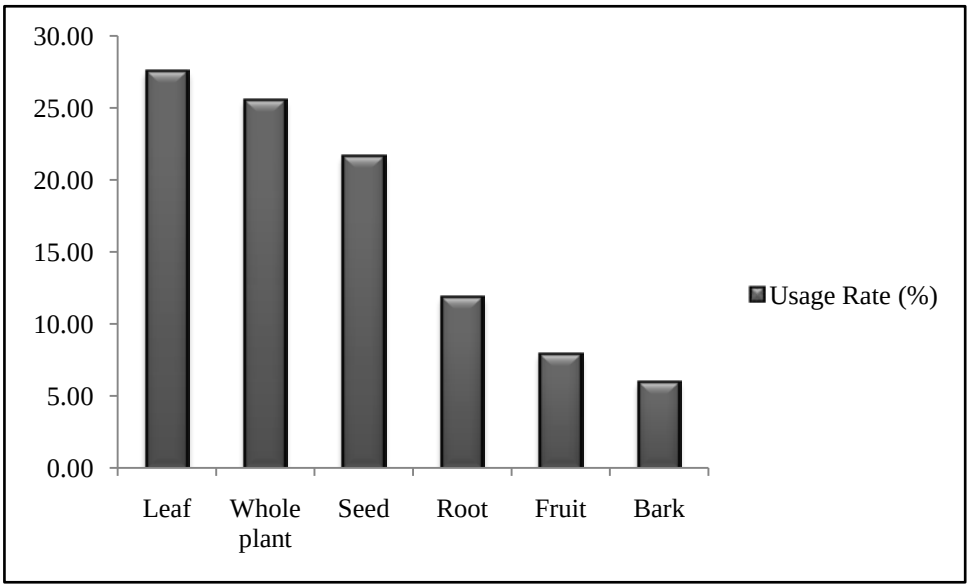

Figure 3 : Plant parts used for the treatment of DM

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College Students on Antidepressants

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Abstract- Depression has been increasingly diagnosed in the college age population with the American College Health Association reporting 16% of all college students having been diagnosed with depression.1 In another large survey of American college students, over half reported some depressive symptoms since entering college.2 Correspondingly, the percentage of all people treated with antidepressants grew over the past two decades. On college campuses in the United States, the numbers of prescriptions for antidepressants increased between the early 1990s and 2005, with estimates as high as 25-50% of the college students being seen in student health counseling centers being medicated with antidepressants.

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College Students on Antidepressants

Aselton [α] & Pamela J [σ]

I. Introduction

Depression has been increasingly diagnosed in the college age population with the American College Health Association reporting 16% of all college students having been diagnosed with depression.[1] In another large survey of American college students, over half reported some depressive symptoms since entering college.[2] Correspondingly, the percentage of all people treated with antidepressants grew over the past two decades. On college campuses in the United States, the numbers of prescriptions for antidepressants increased between the early 1990s and 2005, with estimates as high as 25-50% of the college students being seen in student health counseling centers being medicated with antidepressants. Evidence suggesting increase risk of suicidal thoughts or behavior among children and adolescents taking antidepressants led to the issuing of a public health advisory and a government mandate for "black box" warnings being placed on these medications in 2007.[7] There is now some evidence that the trend of treating adolescents and young adults with antidepressants may be decreasing. Although much has been published on the use of antidepressants and how to identify depression in this age group, there have been few qualitative studies that explore the experience of young people who have been medicated with antidepressants.[5,9]

II. Methods

A qualitative approach with in-depth email interviews was used to explore the experience of college students who have been medicated with antidepressants. Having had time to reflect on their experiences with antidepressants, college students' perspectives are invaluable to enhancing our understanding of the effects of these medications over time in this age group. An Internet-based approach was chosen to reduce their time burden for participation and create a comfortable environment for them to express themselves. The authors' Institutional Review Board approval was obtained before the start of data collection. Collecting qualitative data online eliminates the embarrassment some may face in disclosing sensitive information in a face-to-face interview, and subjects may be more likely to share intimate details and reflect on answers more carefully.[12] The Accessibility of the Internet allowed for students to enter information at any time of day, and allowed time for the researcher to process that information in order to guide the discussion.[13]

The research design consisted of a phenomenological approach with online interviews utilizing concepts from Seidman's guide to in depth interviewing.[14] Seidman's work in developing the three part interview focuses on breaking the interview into the history or background of the phenomenon under study, the experience of living it, and finally a reflection on the experience to search for meaning. The following lists the open ended question used with all these students:

When were you first diagnosed with depression?

Tell me something about your family and where you grew up.

What was your early schooling like?

Do you remember feeling depressed before college?

How was your first experience with antidepressants?

Describe your past treatment for depression, if any.

How did you feel about being treated with antidepressants? What are some of your current sources of stress?

Looking back, do you feel that antidepressants helped you deal with stress?

Do you feel that antidepressants helped you deal with depression?

Have you ever stopped taking an antidepressant, if so, why?

How do you deal with feeling of depression now?

Students were solicited through written notices posted on four campuses and an ad put in a college newspaper. Initial response to recruitment was limited and consequently an incentive of a $25.00 gift was later added. Data collection was started online only after participants had returned the signed informed consent form electronically. Open ended questions were used to solicit responses with additional follow up questions added as the conversation progressed. Emails were exchanged between the participants and the researcher 6-8 times to complete each interview. The total number of email pages of a typed interview varied from 5-10 pages. Interviews continued with the participants until all interview prompts had been used and questions, either the interviewer or subject posed, were answered. As the email session came to a close copies of the text in the

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emails were pasted into a Word document file with the participant's identity being replaced with a number, and all possible identifiers hidden from view. Although absolute anonymity can never be 100% ensured on the internet, every effort was made to protect the subject's confidentiality. Only the researchers saw these emails, and they were kept in the researcher's office when not in use. The informed consent spelled out in detail where the student could turn to for help if the interviews caused them emotional distress and specific numbers of resources for psychological help on each campus in the area was provided.

The sample size of 13 is consistent with the typical sample size identified for phenomenological investigations.[15] Inclusion criteria for this study were to be an undergraduate college student between the ages of 19 and 24 in the Northeast United States who had taken antidepressants at some point in their college years. Exclusion criteria included those who had started taking antidepressants within the past 4 weeks, since they may not have been able to reflect back on their experiences as well as those who have been on them for a longer period of time, as they may be in a somewhat more unstable state. Those who were severely depressed as evidenced by their written material or experiencing suicidal ideation were also not included in the study and were to be immediately connected with their college mental health services.

Open coding was begun utilizing both the Atlas-ti qualitative software package and by hand coding hard copies of interview transcripts. This was followed by a clustering into themes and subthemes by both the first and second readers. Thematic analysis was then utilized to analyze the data in discussions with the second readers. Thematic analysis was then utilized to analyze the data in discussions with the second reader.[11] Once the categories of themes were identified, both readers would compare notes to refine the thematic schema and discuss the meaning of the written material. Trustworthiness was enhanced by member checking to verify the accuracy of statements as the data collection turned into data analysis. Since the interviews were conducted over a period of several days to two months, both the participants and the researcher has time to formulate responses and clarify thoughts of the meaning of these experiences.

III. Results

A total of 13 interviews were completed, after having 26 subjects from 2 of 4 the colleges contacted the researcher to participate in the study. Of the 13 students who did not complete the survey: two were eliminated for having never been on antidepressants, one was eliminated for having only started antidepressants within the last week and the other 10 were either lost to follow-up or never returned their screening or informed consent forms. Of those who did complete the survey, five were male and eight were female. Twelve attended the large state university in the area and one attended a private female undergraduate college. Their ages ranged from 19-22 years of age. Although the majority of the respondents identified as white or Caucasian under ethnic background on the screening form, one student identified as African American, one as half Russian and half Polish and one an Asian American. All attended four year colleges in New England and had been medicated with antidepressants for a period as short as one and a half weeks, in one case, to several years in others with the majority having been on them for at least several months. The major themes extrapolated from the data fell under the headings of:

Childhood and adolescent experiences: perception of younger self, personal and family history of depression and anxiety.

College experience: roommate issues, pressure from family, academic problems, financial and career concerns, someone to talk to.

Feelings about being medicated: medications not helping with depression, family pressure to go on medication, feeling numb, masked causes of depression, embarrassment, problems weaning off antidepressants.

The following text illustrates the major themes identified in this study using the participant's words.

a) Childhood and adolescent experience

Perception of younger self several participants described being very shy while they were younger, having difficulties in school socially and have a history of depression or anxiety.

"I was very shy as a kid and dreaded school more often than not".

"I would get into trouble a lot get called out in the middle of class by a Teacher, which is one of the reasons why I believe I continue to be very self conscious".

"I can recall feeling anxious for a long time, particularly in social settings, possibly as early as 5th grade. I began to feel depressed in high school. In retrospect, I can separate the "depressed feelings" I had then from my current bout of depression. In high school, I was filled with angst and a general distaste for what was considered the norm. When I look back on how I considered myself "depressed" in high school, it Seems juvenile compared to how I feel now".

Another student who started on Paxil in sixth grade remembered feeling very anxious as a child: "I was very anxious as a kid. It started out as separation anxiety around first grade"

Several students mentioned either a family history of depression, anxiety or substance abuse. "The

people I call family are my mother and my sister. Everyone outside that circle that is related me is severely dysfunctional. My grandfather on my mom's side was very abusive to my mother and her sisters. He was an alcoholic." Another student was aware of the struggles with his family's mental history and indicated that the family had discussed these problems and were open to addressing them if they came up in later generations.

"My paternal grandfather died by suicide…My maternal grandfather had some problems while in his 20s with substance abuse and depression. He was also a problem drinker but has now been sober for close to 10 years. My mother has suffered with anxiety since she was a teen as well as my uncle on her side of the family".

b) College experience

Roommate issues: Several students mentioned problems with roommates as being a major stress in college.

"Another thing causing me stress is my living situation. The whole roommate thing, just at (previous college) and here, has not worked out for me. I always have the drunken girl, the girl whose boyfriend sleeps over every night, or the girl who doesn't leave her room.

Although the roommate I have now is better than the THREE I had before, I am still finding myself annoyed at her for wanting to stay up late and watch movies while I sleep, or sleeping until noon while I am up at 7:30 and out starting my day at 8:00 AM".

Pressure from family: Some students continue to feel significant pressure from their parents to achieve. One student worried about the cost of her college education and the burden it was placing on her family since her father was out of work. She also felt she was being harassed by her father, perhaps because of financial concerns.

"It's just continued pressure from home that bothers me, but only when I'm visiting home and in their presence…Continued sources of stress include school (performance pressure from my parents), love life and fear of being verbally harassed by my father…My father has been unemployed for about a year so I sometimes worry if I'm being a financial burden on my parents".

There are also major sources of stress stemming from the family of origin.

"I am the first of my family to go to college. I am also the oldest so there is pressure to succeed and be an example for my younger sister. Pressure to secure a job – my livelihood for the future…I also worry about my Mom a lot".

"Continuing friction with my family creates an undercurrent of stress in my life, as there is little beyond interpersonal conflicts and very little in terms of emotional support or validation".

Academic Problems: "It might be of relevance to note that I was put on academic probation at the end of my first semester on campus since I ended up with less than a 1.00 GPA. It may have been due to a combination of continued pressure from home as well as not being used to such a different environment with so many people".

Financial and Career Concerns: Academics and financial issues were a major source of stress for these students. They worried a great deal about their future career plans, and the fact that college was costing their parents a great deal of money. Several expressed the desire to do well academically in appreciation of their parent's investment in their education.

"I want to do the best I can, I don't want to settle for anything less than As. I often put things off, or become so stressed and overwhelmed that I freeze and don't do my work".

"My major and my future is a major source of stress for me at the moment. I am still undeclared and waiting to see if I get accepted into the major I want.

Not knowing what will happen stresses me out a lot since if I don't get accepted I will be very behind. I am always in debt. The future, employment after I graduate, where I will live, how I will pay rent, how I will fund my graduate education. I am constantly thinking about this and how it all seems insurmountable".

Someone to talk to: A prominent theme in these interviews was the importance of friends to college students.

"I have a lot of good friends. There are only a few I will talk to like this though.

I'm not normally one to express emotions, but when I need to there are a few good long term friends that I can comfortably say anything to".

Another major source of support for several students was their mother. Four students actually cited talking to their mother as a major source of support.

c) Feeling about being medicated

Medications not helping with Depression: Most of the students felt that being on medication did not help them cope with depression any better than not being on medication. Some found the side effects troublesome, while others stated that they were Stressed out just by being on medication. Family and friends; none of them seemed capable of providing the emotional support that I needed. I had talked to a counselor under duress from my mom after a particularly bad blowout had her "concerned" for me, but mostly angry at how I treat her. That summer I had to go back to the psychologist who had seen me earlier who recommended that I go to a psychiatrist who then gave me a prescription".

This same student later went on to state that she only stayed on the medication for a week and a half because she felt they weren't doing anything for her but

making her drowsy. She sums her feelings about her experience with antidepressants below:

"I felt dehumanized. It felt as though the greatest concern was protecting the mentally sound people around me and placating me was the only way to do it. It was a difficult process to be scrutinized in front of family members and it was challenging to feel that everyone was straining to help with my problems".

Feeling numb: Several students reported feeling numb on antidepressants.

"I absolutely hated taking antidepressants. I think they mute people. It makes you a blank human being who is unable to fully express emotions. I would rather have some crazy ups and downs than be static. This is why I stopped taking antidepressants. I've actually been fine and it's been about four months".

"I no longer wish to be on the SSRI and wish to stop taking it. I hate the fac that my mind is being chemically conditioned daily. I have a hard time remembering what kind of person I was prior to taking the SSRI. I feel as if I am a numbed version of myself. I long to be happy and to remember what it is like to feel "naturally" happy and content. I feel that for asa long as I am on the SSRI, any feeling or reaction that I have to my environment is not genuine. I detest the fact that what is happening in my brain is due to chemical therapy".

Masked causes of depression: Many students stated that they really did not like taking the medication and some felt that it may have masked symptoms, rather than helping them to deal with the root causes of depression.

"I think the Zoloft made me have a lack of assertiveness, a little more easy going, but not being all there – if there was some debate going on that I would love to have jumped into and be involved in, I might have sat back and watched, feeling like what I had to say was not important enough to be said".

This sense of detachment and feeling like she wasn't herself led one female student to discontinue her antidepressants.

"Ever since I've been put on the Zoloft, I haven't been "me". I question all my thoughts, and find myself annoyed or frustrated way more easily than I used to.

This is why a few weeks ago, under the supervision of my doctor, I have started to wean down from 50mg a night to 25mg a night".

Students expressed concern that they were covering up their problems by being on medication and not getting to the root of their problems.

"Some (antidepressants) helped with stress and depression more than others, but there is no panacea or cure-all and I wish there was something that was. They don't cure the source of the stress and depression after all".

Embarrassment: Several students felt embarrassed by taking medication. One female student felt that the medication had a positive effect, but was embarrassed about taking them.too much caffeine, PMS, physical ailments…it's all about keeping myself positive and putting the triggers for anxiety in the back of my mind so it won't alter my everyday life".

Writing or journaling: Female students mentioned writing or journaling as a way to unwind and feel better.

"I talk to my boyfriend, write in my journal. I try to change the anxiety to excitement, for example if I have a project to do that I'm really stressed about, it helps if I have some really nice paper and a pen to use to help me create the project, because I enjoy the process a little more, rather than worrying about producing the end result".

Another student cited making lists as a way to help her relax.

"If I am stressed out about things I have to accomplish I like to make lists, it really helps me visualize what I have to get done, and really put it in perspective – usually I feel like I have so much to do, but in reality once it's down on paper, it is not so bad. I try to find and recognize places and feelings of calm and comfort. I try to take more time for myself. Mostly though, I write my thoughts and feelings that trouble me down in a journal. This has been the most effective way for me to clear my head".

Physical activities: Physical activity was cited frequently as a way to relieve stress. Students mentioned running, playing hockey and basketball as ways to relieve their stress.

Music: Many of the male students mentioned listening to music to calm them down.

"I either listen to relaxing music, give myself a pep talk and try to calm myself down rationally, or just wait for it to pass…I love music and movies. I play the drums, but I can't do that here unfortunately: there's no room for my drum-set in my dorm room".

"I found it very helpful to separate myself from whatever it is that makes me feel depressed and relax and listen to music. Listening to music has really helped calm me down and forget about my worries".

Positive response to talk therapy: the majority of students who had been in therapy found it to be very helpful as illustrated in the following quotes:

"Yes, therapy has been very helpful. Unfortunately nothing that I have done has had significant lasting effects. It;'s often good tojust talk about things that are on my mind or triggers my anxiety. I think it is characteristic of anxiety to have irrational fears that you need validated, but also told are unrealistic or improbable".

Advice to others: The process of self-actualization often led to a realization that they did not need medication and needed to deal with their problems on their own.

"Know thyself. And realize that the goals that others and society impose on you aren't necessarily what you were place here to achieve."

"Understand your motivation for thinking the way you do, and stop to make sure That the relationships you're in are really helping you grow. Realize that things can get better".

"I would advise him or her to isolate the source of sadness and how it can be alleviated or resolved. Unless his or her every day is disrupted (that is not getting out of bed, inability to participate in daily responsibilities, self neglect, etc) I would not advise the use of antidepressants".

IV. Comment

The variety of experiences offered in these online interviews provides a snapshot of the college experience for students who have been on antidepressants during a time of great change in their lives and new responsibilities. Allowing the experience to be expressed in the student's own words gave them a chance to reflect on the meaning of their experiences, and many expressed the feeling that antidepressants were not a "panacea" or cure-all. A few felt that they got them through a hard time, particularly those who also suffered from anxiety symptoms.

Most of the side effects participants described are well known in the literature including suicidal ideation, dry mouth, sedation and sexual dysfunction.[16] Students in this study expressed feelings of shame or embarrassment they had to depend on a pill, and concerns that the antidepressant medication was somehow changing them into someone who they were not. The increase stimulation and agitation are well known effects of SSRi antidepressant therapy, particularly when one is just starting medication and may lead to suicidal ideations or actual action[1]. However, the description of feeling numb or not themselves is a more unique finding, and probably a result of using a qualitative approach for this topic. This was often cited as a reason for discontinuing the medication. The participants expressed a desire to experience the full range of emotions again, and not be muted. A recent study in the British Journal of Psychiatry describes an emotional side effect of antidepressants as feeling "blunted" which seems similar to feeling numb[17].

Another study which reviewed 35 clinical trials of antidepressant drugs submitted to the U.S. Food and Drug Administration, concluded that "patients taking antidepressants fared no better than patients taking a placebo" in patients who were either mildly or moderately depressed[16]. The drugs only seemed to benefit those who were severely depressed. The potential to cause possibly life threatening side effects weights heavily on clinicians as they struggle to treat students as major depression in itself is a risk factor for suicide.

These students are coping with the changing job market due to a recession and are being raised by parents who have certain expectations for their success at college and ability to obtain meaningful employment. This has lead to increased stress for both parents and students. The self actualization process many students experience during their college years is a valuable process of learning about oneself and how to be happy. Several of the students who participated in the study actually said that they found writing about their experience to be therapeutic.

Limitations of this study include the possibility that students who felt more strongly about their experience may have been more likely to volunteer, and the fact that the study relied on self report of diagnosis, medication history and side effects. We had a fairly select population attending four year colleges with perhaps more family support than 18-24 year old not attending college. The use of email interviews may be a limitation in that you are not able to observe the participant during the interview and read body language. However, the comfort level of talking online about these issues may balance this limitation.

Future research may focus on more online post-marketing qualitative approaches and could be used in studying common medications to determine how well certain classes of medication are actually working for people in their daily lives. The possibility of using the internet for qualitative studies affords many benefits to both the researcher and participant in terms of ease of use and the comfort in which the participant can express their feelings.

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True Knot of the Umbilical Cord: A Case Report

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Abstract- True umbilical cord knot is one of the abnormalities of the umbilical cord which is a rare occurrence. Constriction of a true knot of the umbilical cord may lead to obstruction of the fetal circulation and subsequent intrauterine death. We present a 20yr old primigravid,a who had a normal vaginal delivery with a true knot of the umbilical cord identified.

Keywords: *normal delivery, true knot, umbilical cord.*

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True Knot of the Umbilical Cord: A Case Report

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Abstract- **True umbilical cord knot is one of the abnormalities of the umbilical cord which is a rare occurrence. Constriction of a true knot of the umbilical cord may lead to obstruction of the fetal circulation and subsequent intrauterine death. We present a 20yr old primigravid,a who had a normal vaginal delivery with a true knot of the umbilical cord identified.**

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I. Introduction

True knots in the umbilical cord are not uncommon, the reported incidence ranging from 0.3 to 2.1% of all deliveries.[1]known predisposing factors for this condition include long cord, small fetus, polyhydramnious and monoamniotic twin pregnancy.[1]Although most knots are loose and present as unexpected findings at delivery, active fetal movements in utero can potentially tighten the knot, leading to obstruction of the fetal circulation and death.[1] Pretnatal diagnosis may therefore be desirable to identify fetuses at risk of fetal distress and perinatal loss.

II. Case

A 20yr old primigravida at 41wks of pregnancy was admitted for induction of labor. She was married for 4yrs and this was a planned spontaneous pregnancy. She attended regular antenatal checkups and the antenatal period was uneventful. Her bishop score was four and cervical priming was done with vaginal suppository tablet misoprostol 25ug. Intrapartum period was uneventful. She delivered alive, male baby of 2.5kg with Apgar score of 7&8 in one and five minutes. There was no excess liquor, no meconium staining and minimum blood loss. The placenta appeared normal. The cord, however, had one knot that was loose. The cord measured 65cm. Her antenatal investigations and ultrasound reports were within normal limits.

III. Discussion

The umbilical cord is called a fetal lifeline.[2,3] Many abnormalities are observed in the morphology and pathology of the umbilical cord but the knowledge of them is rather poor.[4]A sudden umbilical cord compression with a poor layer of wharton's jelly may strongly reduce the umbilical cord venous blood flow and cause a life-threatening risk to the fetus.[5] Some authors believe that 3D power sonography may be helpful in the diagnosis of the umbilical cord knots, especially in the third trimester.[5] Others believe that diagnosis of an umbilical cord knot should be considered in obstetrical situations very cautiously.[6,7] Prenatal sonographic diagnosis of cases of a true knot of the umbilical cord have been reported infrequently. Ramon y Cajal and Martinez reported characteristic sonographic findings of this condition in which a detailed investigation disclosed a transverse section of the umbilical cord surrounded by a loop of umbilical cord. This finding, noted in 5 cases, was termed the "hanging noose" sign.[8]

In conclusion, four-dimensional and color Doppler examination is very important to diagnose a true umbilical cord. This diagnosis necessitates strict monitoring of fetal wellbeing during the pregnancy and the delivery. True umbilical cord knot diagnosis may reduce sudden and unforeseen fetal distress.

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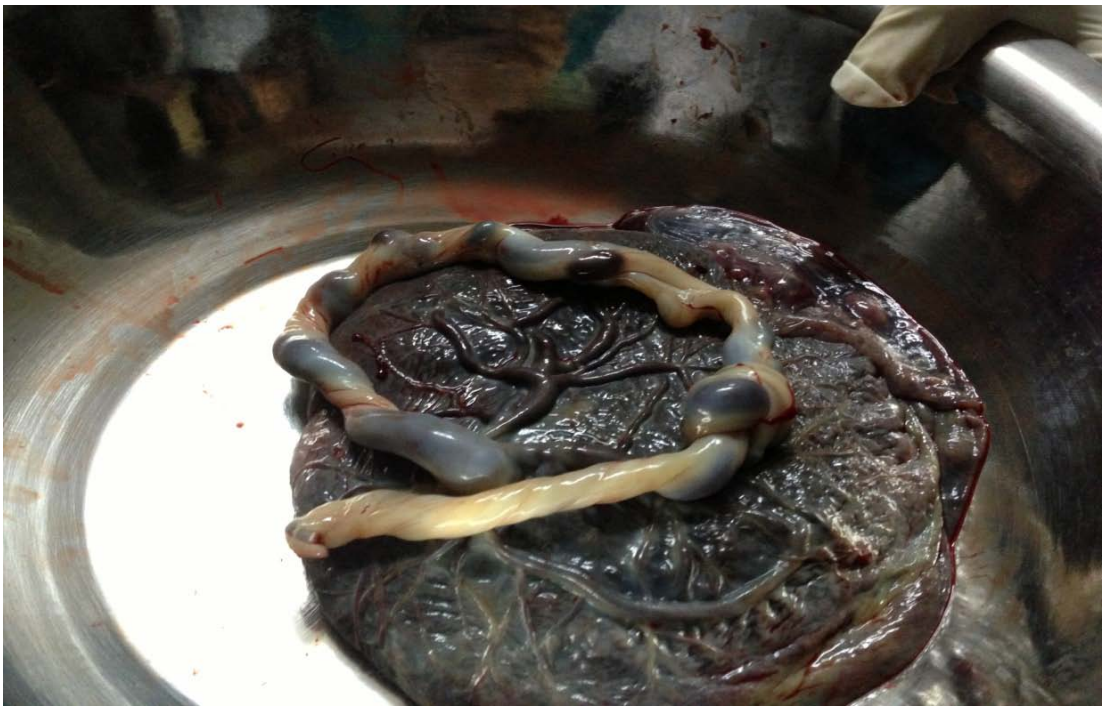
Figure 1 : True Knot of the Umbilical Cord



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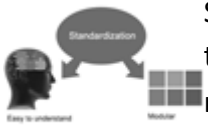

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3. Submission of Manuscripts,

4. Manuscript's Category,

5. Structure and Format of Manuscript,

6. After Acceptance.

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28. Make colleagues: Always try to make colleagues. No matter how sharper or intelligent you are, if you make colleagues you can have several ideas, which will be helpful for your research.

29. Think technically: Always think technically. If anything happens, then search its reasons, its benefits, and demerits.

30. Think and then print: When you will go to print your paper, notice that tables are not be split, headings are not detached from their descriptions, and page sequence is maintained.

31. Adding unnecessary information: Do not add unnecessary information, like, I have used MS Excel to draw graph. Do not add irrelevant and inappropriate material. These all will create superfluous. Foreign terminology and phrases are not apropos. One should NEVER take a broad view. Analogy in script is like feathers on a snake. Not at all use a large word when a very small one would be sufficient. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Amplification is a billion times of inferior quality than sarcasm.

32. Never oversimplify everything: To add material in your research paper, never go for oversimplification. This will definitely irritate the evaluator. Be more or less specific. Also too, by no means, ever use rhythmic redundancies. Contractions aren't essential and shouldn't be there used. Comparisons are as terrible as clichés. Give up ampersands and abbreviations, and so on. Remove commas, that are, not necessary. Parenthetical words however should be together with this in commas. Understatement is all the time the complete best way to put onward earth-shaking thoughts. Give a detailed literary review.

33. Report concluded results: Use concluded results. From raw data, filter the results and then conclude your studies based on measurements and observations taken. Significant figures and appropriate number of decimal places should be used. Parenthetical remarks are prohibitive. Proofread carefully at final stage. In the end give outline to your arguments. Spot out perspectives of further study of this subject. Justify your conclusion by at the bottom of them with sufficient justifications and examples.

34. After conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium though which your research is going to be in print to the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects in your research.

Informal Guidelines of Research Paper Writing

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form, which is presented in the guidelines using the template.
- Please note the criterion for grading the final paper by peer-reviewers.

Final Points:

A purpose of organizing a research paper is to let people to interpret your effort selectively. The journal requires the following sections, submitted in the order listed, each section to start on a new page.

The introduction will be compiled from reference matter and will reflect the design processes or outline of basis that direct you to make study. As you will carry out the process of study, the method and process section will be constructed as like that. The result segment will show related statistics in nearly sequential order and will direct the reviewers next to the similar intellectual paths throughout the data that you took to carry out your study. The discussion section will provide understanding of the data and projections as to the implication of the results. The use of good quality references all through the paper will give the effort trustworthiness by representing an alertness of prior workings.

Writing a research paper is not an easy job no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record keeping are the only means to make straightforward the progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear

· Adhere to recommended page limits

Mistakes to evade

- Insertion a title at the foot of a page with the subsequent text on the next page
- Separating a table/chart or figure - impound each figure/table to a single page
- Submitting a manuscript with pages out of sequence

In every sections of your document

· Use standard writing style including articles ("a", "the," etc.)

· Keep on paying attention on the research topic of the paper

· Use paragraphs to split each significant point (excluding for the abstract)

· Align the primary line of each section

· Present your points in sound order

· Use present tense to report well accepted

· Use past tense to describe specific results

· Shun familiar wording, don't address the reviewer directly, and don't use slang, slang language, or superlatives

· Shun use of extra pictures - include only those figures essential to presenting results

Title Page:

Choose a revealing title. It should be short. It should not have non-standard acronyms or abbreviations. It should not exceed two printed lines. It should include the name(s) and address (es) of all authors.

Abstract:

The summary should be two hundred words or less. It should briefly and clearly explain the key findings reported in the manuscript--must have precise statistics. It should not have abnormal acronyms or abbreviations. It should be logical in itself. Shun citing references at this point.

An abstract is a brief distinct paragraph summary of finished work or work in development. In a minute or less a reviewer can be taught the foundation behind the study, common approach to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Yet, use comprehensive sentences and do not let go readability for briefness. You can maintain it succinct by phrasing sentences so that they provide more than lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study, with the subsequent elements in any summary. Try to maintain the initial two items to no more than one ruling each.

- Reason of the study - theory, overall issue, purpose
- Fundamental goal
- To the point depiction of the research
- Consequences, including definite statistics - if the consequences are quantitative in nature, account quantitative data; results of any numerical analysis should be reported
- Significant conclusions or questions that track from the research(es)

Approach:

- Single section, and succinct
- As a outline of job done, it is always written in past tense
- A conceptual should situate on its own, and not submit to any other part of the paper such as a form or table
- Center on shortening results - bound background information to a verdict or two, if completely necessary
- What you account in an conceptual must be regular with what you reported in the manuscript
- Exact spelling, clearness of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else

Introduction:

The **Introduction** should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable to comprehend and calculate the purpose of your study without having to submit to other works. The basis for the study should be offered. Give most important references but shun difficult to make a comprehensive appraisal of the topic. In the introduction, describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will have no attention in your result. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here. Following approach can create a valuable beginning:

- Explain the value (significance) of the study
- Shield the model - why did you employ this particular system or method? What is its compensation? You strength remark on its appropriateness from a abstract point of vision as well as point out sensible reasons for using it.
- Present a justification. Status your particular theory (es) or aim(s), and describe the logic that led you to choose them.
- Very for a short time explain the tentative propose and how it skilled the declared objectives.

Approach:

- Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done.
- Sort out your thoughts; manufacture one key point with every section. If you make the four points listed above, you will need a least of four paragraphs.

- Present surroundings information only as desirable in order hold up a situation. The reviewer does not desire to read the whole thing you know about a topic.
- Shape the theory/purpose specifically - do not take a broad view.
- As always, give awareness to spelling, simplicity and correctness of sentences and phrases.

Procedures (Methods and Materials):

This part is supposed to be the easiest to carve if you have good skills. A sound written Procedures segment allows a capable scientist to replacement your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt for the least amount of information that would permit another capable scientist to spare your outcome but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section. When a technique is used that has been well described in another object, mention the specific item describing a way but draw the basic principle while stating the situation. The purpose is to text all particular resources and broad procedures, so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step by step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

- Explain materials individually only if the study is so complex that it saves liberty this way.
- Embrace particular materials, and any tools or provisions that are not frequently found in laboratories.
- Do not take in frequently found.
- If use of a definite type of tools.
- Materials may be reported in a part section or else they may be recognized along with your measures.

Methods:

- Report the method (not particulars of each process that engaged the same methodology)
- Describe the method entirely
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures
- Simplify - details how procedures were completed not how they were exclusively performed on a particular day.
- If well known procedures were used, account the procedure by name, possibly with reference, and that's all.

Approach:

- It is embarrassed or not possible to use vigorous voice when documenting methods with no using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result when script up the methods most authors use third person passive voice.
- Use standard style in this and in every other part of the paper - avoid familiar lists, and use full sentences.

What to keep away from

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings - save it for the argument.
- Leave out information that is immaterial to a third party.

Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part a entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Carry on to be to the point, by means of statistics and tables, if suitable, to present consequences most efficiently.You must obviously differentiate material that would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matter should not be submitted at all except requested by the instructor.

Content

- Sum up your conclusion in text and demonstrate them, if suitable, with figures and tables.
- In manuscript, explain each of your consequences, point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation an exacting study.
- Explain results of control experiments and comprise remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or in manuscript form.

What to stay away from

- Do not discuss or infer your outcome, report surroundings information, or try to explain anything.
- Not at all, take in raw data or intermediate calculations in a research manuscript.
- Do not present the similar data more than once.
- Manuscript should complement any figures or tables, not duplicate the identical information.
- Never confuse figures with tables - there is a difference.

Approach

- As forever, use past tense when you submit to your results, and put the whole thing in a reasonable order.
- Put figures and tables, appropriately numbered, in order at the end of the report
- If you desire, you may place your figures and tables properly within the text of your results part.

Figures and tables

- If you put figures and tables at the end of the details, make certain that they are visibly distinguished from any attach appendix materials, such as raw facts
- Despite of position, each figure must be numbered one after the other and complete with subtitle
- In spite of position, each table must be titled, numbered one after the other and complete with heading
- All figure and table must be adequately complete that it could situate on its own, divide from text

Discussion:

The Discussion is expected the trickiest segment to write and describe. A lot of papers submitted for journal are discarded based on problems with the Discussion. There is no head of state for how long a argument should be. Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implication of the study. The purpose here is to offer an understanding of your results and hold up for all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of result should be visibly described. Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved with prospect, and let it drop at that.

- Make a decision if each premise is supported, discarded, or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."
- Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work
- You may propose future guidelines, such as how the experiment might be personalized to accomplish a new idea.
- Give details all of your remarks as much as possible, focus on mechanisms.
- Make a decision if the tentative design sufficiently addressed the theory, and whether or not it was correctly restricted.
- Try to present substitute explanations if sensible alternatives be present.
- One research will not counter an overall question, so maintain the large picture in mind, where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

- When you refer to information, differentiate data generated by your own studies from available information
- Submit to work done by specific persons (including you) in past tense.
- Submit to generally acknowledged facts and main beliefs in present tense.

Administration Rules Listed Before Submitting Your Research Paper to Global Journals Inc. (US)

Please carefully note down following rules and regulation before submitting your Research Paper to Global Journals Inc. (US):

Segment Draft and Final Research Paper: You have to strictly follow the template of research paper. If it is not done your paper may get rejected.

- The **major constraint** is that you must independently make all content, tables, graphs, and facts that are offered in the paper. You must write each part of the paper wholly on your own. The Peer-reviewers need to identify your own perceptive of the concepts in your own terms. NEVER extract straight from any foundation, and never rephrase someone else's analysis.

- Do not give permission to anyone else to "PROOFREAD" your manuscript.

- Methods to avoid Plagiarism is applied by us on every paper, if found guilty, you will be blacklisted by all of our collaborated research groups, your institution will be informed for this and strict legal actions will be taken immediately.)
- To guard yourself and others from possible illegal use please do not permit anyone right to use to your paper and files.

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Topics	Grades		
	A-B	**C-D**	**E-F**
Abstract	Clear and concise with appropriate content, Correct format. 200 words or below	Unclear summary and no specific data, Incorrect form Above 200 words	No specific data with ambiguous information Above 250 words
Introduction	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
Methods and Procedures	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
Discussion	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

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