



جامعة  
بنغازي الحديثة



**مجلة جامعة بنغازي الحديثة للعلوم  
والدراسات الإنسانية  
مجلة علمية إلكترونية محكمة**

**العدد السادس**

**لسنة 2019**

حقوق الطبع محفوظة

## شروط كتابة البحث العلمي في مجلة جامعة بنغازي الحديثة للعلوم والدراسات الإنسانية

- 1- الملخص باللغة العربية وباللغة الانجليزية (150 كلمة).
- 2- المقدمة، وتشمل التالي:
  - ❖ نبذة عن موضوع الدراسة (مدخل).
  - ❖ مشكلة الدراسة.
  - ❖ أهمية الدراسة.
  - ❖ أهداف الدراسة.
  - ❖ المنهج العلمي المتبع في الدراسة.
- 3- الخاتمة. (أهم نتائج البحث - التوصيات).
- 4- قائمة المصادر والمراجع.
- 5- عدد صفحات البحث لا تزيد عن (25) صفحة متضمنة الملاحق وقائمة المصادر والمراجع.

### القواعد العامة لقبول النشر

1. تقبل المجلة نشر البحوث باللغتين العربية والانجليزية؛ والتي تتوافر فيها الشروط الآتية:
  - أن يكون البحث أصيلاً، وتتوافر فيه شروط البحث العلمي المعتمد على الأصول العلمية والمنهجية المتعارف عليها من حيث الإحاطة والاستقصاء والإضافة المعرفية (النتائج) والمنهجية والتوثيق وسلامة اللغة ودقة التعبير.
  - ألا يكون البحث قد سبق نشره أو قُدم للنشر في أي جهة أخرى أو مستل من رسالة أو اطروحة علمية.
  - أن يكون البحث مراعيًا لقواعد الضبط ودقة الرسوم والأشكال - إن وجدت - ومطبوعاً على ملف وورد، حجم الخط (14) وبخط (Arial 'Body') للغة العربية. وحجم الخط (12) بخط (Times New Roman) للغة الإنجليزية.
  - أن تكون الجداول والأشكال مدرجة في أماكنها الصحيحة، وأن تشمل العناوين والبيانات الإيضاحية.
  - أن يكون البحث ملتزماً بدقة التوثيق حسب دليل جمعية علم النفس الأمريكية (APA) وتثبيت هوامش البحث في نفس الصفحة والمصادر والمراجع في نهاية البحث على النحو الآتي:
  - أن تُثبت المراجع بذكر اسم المؤلف، ثم يوضع تاريخ نشره بين حاصرتين، يلي ذلك عنوان المصدر، متبوعاً باسم المحقق أو المترجم، ودار النشر، ومكان النشر، ورقم الجزء، ورقم الصفحة.
  - عند استخدام الدوريات (المجلات، المؤتمرات العلمية، الندوات) بوصفها مراجع للبحث: يُذكر اسم صاحب المقالة كاملاً، ثم تاريخ النشر بين حاصرتين، ثم عنوان المقالة، ثم ذكر اسم المجلة، ثم رقم المجلد، ثم رقم العدد، ودار النشر، ومكان النشر، ورقم الصفحة.
2. يقدم الباحث ملخص باللغتين العربية والانجليزية في حدود (150 كلمة) بحيث يتضمن مشكلة الدراسة، والهدف الرئيسي للدراسة، ومنهجية الدراسة، ونتائج الدراسة. ووضع الكلمات الرئيسية في نهاية الملخص (خمس كلمات).

3. تحتفظ مجلة جامعة بنغازي الحديثة بحقها في أسلوب إخراج البحث النهائي عند النشر.

## إجراءات النشر

ترسل جميع المواد عبر البريد الإلكتروني الخاص بالمجلة جامعة بنغازي الحديثة وهو كالتالي:

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- ✓ لا يقبل استلام الورقة العلمية الا بشروط وفورمات مجلة جامعة بنغازي الحديثة.
- ✓ في حالة قبول البحث مبدئياً يتم عرضة على مُحكمين من ذوي الاختصاص في مجال البحث، ويتم اختيارهم بسرية تامة، ولا يُعرض عليهم اسم الباحث أو بياناته، وذلك لإبداء آرائهم حول مدى أصالة البحث، وقيمتها العلمية، ومدى التزام الباحث بالمنهجية المتعارف عليها، ويطلب من المحكم تحديد مدى صلاحية البحث للنشر في المجلة من عدمها.
- ✓ يُخطر الباحث بقرار صلاحية بحثه للنشر من عدمها خلال شهرين من تاريخ الاستلام للبحث، وبموعد النشر، ورقم العدد الذي سينشر فيه البحث.
- ✓ في حالة ورود ملاحظات من المحكمين، تُرسل تلك الملاحظات إلى الباحث لإجراء التعديلات اللازمة بموجبها، على أن تعاد للمجلة خلال مدة أقصاها عشرة أيام.
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# THE THERAPEUTIC VALUE OF HIBISCUS SABDARIFFA LINN. IS IT FACT OR FICTION? (MINI REVIEW)

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## **Abstract:**

Many literatures reported that, Hibiscus sabdariffa Linn.(Roselle) is a plant contains proteins, fats, carbohydrates, flavonoids, acids, minerals and vitamins. It has also been reported that, the plant has an antihypertensive, hepatoprotective, antihyperlipidemic, antibacterial, anticancer, antioxidant effects and many other therapeutic impacts. It has been used in herbal folk medicine as a mild laxative, sedative and diuretic . The calyx of the plant was used as a refreshing beverage (Hibiscus tea) in many countries. The present mini-review focused on certain phytochemical and pharmacological therapeutic effects of the plant reported lately in different reviews and literatures, to emphasize on the truth of its medicinal effectiveness and roll out any fiction.

**Key words:** Hibiscus sabdariffa Linn., Hibiscus tea, Herbal folk medicine, Roselle, calyx.

## **المخلص:**

العديد من المقالات والأوراق العلمية ذكرت بأن نبات الكركديه (روسيل) وهو نبات شجيري حولي من جنس الخطمي وينتمي إلى الفصيلة الخبازية يحتوي على مواد ملونه وبروتين ودهن وكربوهيدرات وأملاح وفيتامينات وأنه نبات له فوائد طبية عديدة. كؤوس زهرات النبات يتم استعمالها لتحضير مشروب ملطف على نحو بارد أو ساخن في بلاد عديده كما تم استخدامها كعلاج لعدوى الميكروبات وارتفاع ضغط الدم والدهون ولتنشيط الهضم وكمضاد لأمراض الكبد والأكسدة وعلاج لبعض أنواع سرطان الدم والجلد. لقد تم استعمال النبات بالطب الشعبي ملين ومهدئ ومدد للبول بالعديد من البلاد كالهند ومصر والسودان. تم التركيز بهذه المراجعة العلمية المصغرة على تأكيد صحة هذه الفوائد الطبية ودحض ما عداها من تخمينات غير مؤكده والتي لم تعتمد في تفويدها للنبات على أسس علميه متينه.

## Introduction:

Traditional medicine is explored extensively since ancient times and the use of medicinal plants and their phytochemicals for treating various diseases is well documented<sup>48</sup>. *Hibiscus sabdariffa* Linn. is an indigenous plant native to Asia (India to Malaysia) and tropical Africa. The plant is widely grown in tropics like Caribbean, Central America, India, Australia, Brazil, Florida, Philippines, Hawaii as a home garden crop, In Sudan, it's a major crop of export especially in western part<sup>1</sup>. *Hibiscus sabdariffa* Linn. is the latin name while in English-speaking regions in addition to Roselle it is called as Sorrel. In North Africa and Near east, Roselle is called Karkade' or Carcade' and it is known by these names in the pharmaceutical and food flavoring trades in Europe<sup>1</sup>. Many other names worldwide are also present.

In Egypt, Sudan and Arab world, Hibiscus tea from the calyces, is known as Karkade' and is served as both hot and cold drink and commonly used to make jellies, jams and beverages<sup>1</sup>. In literature of India, different parts of the plant been reported to manage hypertension, fever and liver disorders, traditionally it has been used as a purgative, sedative, diuretic, and antiseptic<sup>1</sup>. The world's best Roselle comes from Sudan, but the quantity is low and poor processing hampers quality, Mexico, Egypt, Senegal, Tanzania, Mali and Jamaica are also important suppliers but production is usually used domestically<sup>2</sup>.

In Vietnam, the young leaves, stems and fruits are used for cooking soups with fish or eel<sup>3</sup>. In France it can be found in markets as flowers or syrup where there are immigrant communities, the red calyces of the plant are increasingly exported to the United State and Europe, particularly Germany, where they are used as food colourings<sup>4</sup>. In Nigeria to make a refreshing drink known as zobo a natural fruit juice of pineapple, watermelon and ginger are added to the herb. In Lebanon toasted pine nuts is added. Rosella jam is made in Queensland-Australia as a home-made or specialty product sold at fetes and other community events<sup>5</sup>.

Many phytochemical and pharmacological studies on the different parts of the plant have been established, some of these have found that anthocyanins are believed to be the antihypertensive compounds of the plant<sup>6</sup>, others have found that Roselle may be hepatotoxic in high doses<sup>7</sup>. More studies are needed on animal and human subjects to emphasize on this annual herbaceous shrub therapeutic values.



**HIBISCUS TEA.**



**ROSELLE SYRUP.**

**Basic botanical descriptions of Hibiscus sabdariffa linn.:**

The plant order is (Malvales), the family is (Malvaceae-Mallows), while the genus is (Hibiscus) and the species is (Hibiscus sabdariffa Linn.), it's about 3.5m long . It has a profound penetrating slim roots and smooth cylindrical typically dark green to red stems. Leaves are alternate, 7.5-12.5cm tall, green with reddish veins and long or short petioles. Flowers born singly in the leaf axils are up to 12.5cm wide, yellow with a rose or maroon eye and turn pink as they wither at the end of the day, they take 6 months to mature. The typically red calyx consist of 5 large sepals, they begin to enlarge at the end of the day, 3.2-5.7cm long and fully enclosed the fruit. The fruit is velvety capsule, which is green when immature each containing the seeds. The capsule turns brown and splits open when mature and dry. Seeds are kidney-shaped light brown<sup>1</sup>.

**Phytochemical constituents of different parts of Hibiscus sabdariffa linn.:**

The leaf contains protein, fat, carbohydrate, fibre, ash, calcium, phosphorus, iron, thiamine,  $\beta$ -carotene, riboflavin, niacin,  $\beta$ -sistosterol, iso-propyl alcohol, methanol, ethanol, malic acid, and ascorbic acid<sup>1</sup>. The major pigment identified in the flower is daphniphylline, in addition three water soluble polysaccharides such as arabinans have been isolated from flower buds<sup>1</sup>.The calyces are rich in acid and pectin. Analysis of calyces has shown the presence of crude protein and minerals such as iron, phosphorus, calcium, manganese, aluminium, magnesium, sodium and potassium. Mucilage, Calcium Citrate, ascorbic acid, and flavonoids are also present<sup>1</sup>. Seeds contain fat, starch, cellulose, cholesterol, ergosterol, carbohydrates, ethanol, nitrogen, isopropyl alcohol and dietary fibre which content were found to be high. Minerals like phosphorus, magnesium, calcium, and amino acids as lysine and tryptophan were found in the seeds too. Seed oil is rich in unsaturated fatty acids (70%), of which linoleic acid constituted 44%. Steroids and tocopherols have been found too in the seed oil<sup>1</sup>.

Roselle seeds were found to be a good source of lipid-soluble antioxidants. Roots of Roselle contain tartaric acid and saponin<sup>1</sup>.



**flower of Hibiscus sabdariffa linn.**



**Leafs of Hibiscus sabdariffa linn.**



**seeds of Hibiscus sabdariffa linn.**



**Calyx of Hibiscus sabdariffa linn.**



**Roots of Hibiscus sabdariffa linn.**

## Some pharmacological properties of *Hibiscus sabdariffa* linn.:

### a. Antihypertensive impact:

The aqueous extracts of the calyx showed a dose-dependent decrease in mean arterial pressure of the rats due to a vasodilator effect on the aortic rings which could be mainly mediated via the endothelium derived nitric oxide-cGMP relaxant route and inhibition of calcium influx into vascular smooth muscle cells<sup>8</sup>. In total, 390 participants effects of sour tea *Hibiscus sabdariffa* on arterial hypertension in a meta-analysis of randomized controlled trials have shown a significant effect in lowering both SBP and DBP<sup>9</sup>. A daily consumption of *Hibiscus* tea (Tisane), lowers BP in pre- and mildly hypertensive adults and proves to be as an effective component of the dietary changes recommended for people with these conditions<sup>10</sup>. In a comprehensive review of animal and human studies, the extracts of *Hibiscus sabdariffa* were found to be promising as a treatment of hypertension and hyperlipidemia<sup>7</sup>.

The competitive Angiotensin converting enzyme inhibitor activity of the plant anthocyanins 1 and 2 isolated by bioassay-guided purification, is in good agreement with the folk medicinal use of *Hibiscus sabdariffa* calyces as an antihypertensive<sup>11</sup>. The investigation of the water extract of the dried calyx of *Hibiscus sabdariffa* and *Hibiscus* anthocyanins on left ventricular myocardial capillary length and surface area in spontaneously hypertensive rats (SHRs), have shown that the beneficial effect of *Hibiscus sabdariffa* on high blood pressure in (SHRs), could be mediated through a reduction in the diffusion distance between capillaries and myocytes, as well as new vessel formation<sup>12</sup>.

### b. Hepatoprotective impact:

It has been reported that, the water extract and anthocyanins of *Hibiscus sabdariffa* have a protective effect against Paracetamol induced-liver damage<sup>13</sup>, while the anti-hepatotoxic activity of *Hibiscus sabdariffa* extract in Streptozotocin diabetic rats could be partly related to its antioxidant activity and the presence of flavonoids<sup>14</sup>. Consumption of *Hibiscus sabdariffa* reduced obesity, abdominal fat, serum FFA and improved liver steatosis, the plant could also act as an adjunctive for preventing obesity and non-alcoholic fatty liver<sup>15</sup>.

### c. Antihyperlipidemic impact:

An aqueous extracts from the dried calyx of *Hibiscus sabdariffa* have shown a hypocholesterolemic and antioxidant effects in hypercholesterolemic rats<sup>16</sup>. A study to investigate the hypolipidemic impacts of *Hibiscus sabdariffa* Linn. sour tea in patients with diabetes compared them with those of black tea in a sequential randomized controlled trial, showed that sour tea has improved blood lipid profiles in patients with diabetes<sup>17</sup>. A randomized clinical trial, *Hibiscus sabdariffa* extract has also shown a therapeutic value in management of hypercholesterolemia<sup>18</sup>, while in another comprehensive review of animal and human studies, extracts of Roselle were promising as a treatment of hypertension and hyperlipidemia<sup>7</sup>.

### d. Antioxidant impact:

Using a liquid chromatography /quadrupole-time-of-flight mass spectrometry method, eight accessions of *Hibiscus sabdariffa* have been evaluated for their antioxidant activities and found that the plant accessions exhibited a powerful antioxidant activities<sup>19</sup>, while the *Hibiscus sabdariffa* antioxidant capability as a powerful chelating agent of ferrous ions in aqueous and alcoholic extracts was demonstrated



remarkable<sup>20</sup>. The antioxidant and free radical scavenging effects of two fractions of ethanol extract obtained from Roselle dried flowers were evaluated and found that both fractions scavenge hydrogen peroxide (79-94%) at the dose of 500micro gram, similarly, the extracts showed inhibitory (70-80/%) effects on superoxide anions radicals(O<sub>2</sub><sup>-</sup>) at a dose of 1000micro gram<sup>21</sup>. The rich flavaonoids and polyphenolic content of the plant makes it a strong antioxidant, the antioxidant property of Hibiscus sabdariffa in shattering out the free radicals generated as a result of oxidative stress helping for brain health and as a solution for most of the cognitive ailments were discussed and reviewed<sup>37</sup>

#### **e. Antidiabetic impact:**

Hibiscus sabdariffa extracts have shown therapeutic promise in the prevention of Metabolic syndrome (an obesity-associated collection of disorders each of which contributes to cardiovascular risk), mostly because of the several polyphenols present in the plant<sup>22</sup>. The Roselle calyx extract has shown too an enhancing effect on insulin secretion in normal and Streptozotocin- induced diabetic rats<sup>23</sup>. As already known, that Hibiscus sabdariffa polyphenol extracts are beneficial for diabetic kidneys, an improvement in diabetic nephropathy via attenuating renal epithelial mesenchymal transition in diabetic rat model and HK-2 cells have been confirmed<sup>24</sup>.

#### **f. Anticancer impact:**

On a panel of human tumor cell lines of multiple Myeloma(MM) cells and oral squamous carcinoma (OSCC) cells, Hibiscus sabdariffa was assessed, in both the plant has impaired cell growth, exerted a reversible cytostatic effect and decreased cell motility and invasiveness. The results suggest that Hibiscus sabdariffa may be a potential therapeutic agent against human squamos cell carcinoma and multiple myeloma cells<sup>25</sup>. Further data has indicated that Hibiscus leaf polyphenolic extract, could be developed as a human antimelanoma agent.<sup>26</sup> In addition it has been also found that the Anthocyanin-rich extract from Hibiscus sabdariffa inhibits N-Nitrosomethylurea-induced Leukemia in rats<sup>27</sup>. While in vitro transwell assay revealed that a dose –dependently Hibiscus sabdariffa leaf extract inhibited the migration and invasion of human lymph node carcinoma of the prostate cells under non-cytotoxic concentration<sup>28</sup>.

#### **g. Other Impacts:**

Oral administration of ethanol extract at the dose of 800mg/kg significantly reduced the number of contortions and stretching induced by acetic acid in mice, the ethanol and the vacuum dried extract of Hibiscus sabdariffa 200-800mg/kg p.o decreased the yeast-induced fever in rats, while plant extract has no effect on carrageenin-induced paw edema in rats. These results suggest that ethanol and aqueous extracts(vacuum dry) of Hibiscus sabdariffa calyces possess an antipyretic activity in experimental animals through mechanisms that are different from that of aspirin<sup>29</sup>. Furthermore the study of the antinociceptive, anti-inflammatory and antidiarrheal impacts of the ethanol calyx extract in mice confirmed and supporting its uses in folk medicine<sup>30</sup>. On the other hand the inhibition of intestinal motility by methanol extract in rats showed a significant dose dependent relaxant effect on rat ileal strip comparable to the effect shown by nifedipine and papaverine as reference compounds<sup>31</sup>. Caution should be carried out with the use of Hibiscus sabdariffa during pregnancy and lactation, until further human studies is conducted to confirm plant safety, however there is in vitro signals from animal studies, that seeds of Hibiscus sabdariffa have a lactogenic

effect<sup>32</sup>. Effect of zobo drink (*H.sabdariffa* water extract) on the pharmacokinetics of acetaminophen in human volunteers was studied and the results showed no statistical significant changes in the absorption parameters as  $t_{1/2}$ ,  $T_{max}$ , and AUC after administration of zobo, so further investigations are required to roll in or roll out the plant clinical significance over acetaminophen pharmacokinetic profile<sup>33</sup>. On a healthy human volunteers *Hibiscus sabdariffa* studies shown a decline in diclofenac excretion<sup>34</sup> and a reduction in chloroquine bioavailability<sup>35</sup>. The Polysaccharides of *Hibiscus sabdariffa* flowers can induce proliferation and differentiation of human keratinocytes.<sup>36</sup> Nootropic activity of calyces of *Hibiscus sabdariffa* linn. was evaluated in mice, the plant elicited an anti-amnesic effects, which might prove to be a useful memory restorative agent in the management of dementia seen in elderly, the underlying mechanism of action might be ascribed to its anti acetylcholinesterase activity<sup>38</sup>.

The neuropharmacological sedative activity of the aqueous extract of *Hibiscus sabdariffa* is because of its psychoactive substances that are sedative in nature and which participated to its use in folk remedies<sup>39</sup>. In a laboratory study Roselle cold extract or syrup treatment, showed an anticlastogenic effect upon the chromosomes damage while hot extract has not, using a variety of short-term bioassays<sup>40</sup>. While in other different research, *Hibiscus sabdariffa* cold (25°C) and hot (90°C) water extract were prepared to determine their phytochemical and physiochemical properties, in general both cold and hot extractions showed similar phytochemical peculiarities, however color degradation was less under cold extractions<sup>41</sup>. The inhibitory effect of Roselle calyx extract and protocatechuic acid against susceptible and antibiotic-resistant *Campylobacter* Jejuni, *C. coli* and *C. fetus* in agar plate and ground beef was examined and data showed, that roselle calyx extract and protocatechuic acid may be used for meat food to prevent contamination from *Campylobacter* and aerobes, as well as to delay lipid oxidation<sup>42</sup>. Roselle water and ethanol extracts was tested with *Bacillus subtilis*, *Staphylococcus*, and *Escherichia coli*, the inhibition of Roselle ethanol extract against *B.subtilis* and *S.aureus* was slightly higher than that of water extract, while *E.coli* was strongly inhibited by the Roselle water extract<sup>43</sup>. Others have reported an antimicrobial impact of *Hibiscus sabdariffa* extract against six *Escherichia coli* and two *Klebsiella pneumoniae* uropathogenic strains isolated from patients with recurrent urinary tract infections<sup>44</sup>. The potential haematological impacts associated with the administration of water leaf extract of *Hibiscus sabdariffa* was evaluated in Albino rats, the plant showed a reduction in haemoglobin concentration, packed cell volume, white blood cell count and platelet count without showing any haemostatic effect on bleeding time neither clotting time or prothrombin time and partial thromboplastin time<sup>45</sup>. The anti-ulcerogenic property of ethanolic extract of dried calyces in different ulcer models in Wistar albino rats, showed an ability to protect against Indomethacin-induced gastric ulcer models through an antisecretory and antioxidant mechanisms attributed to the phytochemical constitutes present in Roselle calyces<sup>46</sup>. In male Wistar Rats, Water fraction of Roselle calyx and ethyl acetate fraction was effective as an anti-hyperuricemic agent, the ethanol extract of Roselle calyx and its fraction had a uricosuric impact similar to Probenicid, while the best uricosuric effect was showed by ethyl acetate fraction<sup>47</sup>. Roselle is rich in phytochemicals as it well known, and it has been reported that, the plant is able to modulate obesity via its antioxidant mechanism and reduction in adipogenesis, it has also a significant impact on lipid metabolism, fat absorption, excretion, and obesity related enzymes<sup>48</sup>. The chronic administration of aqueous extract of flowers of *Hibiscus sabdariffa* on the histology of the kidney and some biochemical indices of

renal function in male Wistar rats maybe toxic to the kidney.<sup>49</sup> Finally an immune - enhancing activity of polysaccharides from Roselle have been demonstrated which significantly promote the proliferation of spleen cells induced by Con A and LPS and activate macrophages through MAPK and NF- $\kappa$ B signaling path ways<sup>50</sup>.

### Conclusion:

Most of the results of the phytochemical and pharmacological studies, researches, and evaluations have consolidated and supported the facts of plant therapeutic traditional uses. Roselle may prove to be useful for more laboratory and clinical evaluation to develop new therapeutic agents on a scientific groundwork. Introduction and commercial cultivation of Hibiscus different varieties is also recommended in countries, where climate and soil allow.

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