



## Natural Product as Chemoprevention from *Maqasid Shariah* Perspective: A Narrative Review

Maryam Syahidah Azalan<sup>1</sup> and Radiah Abdul Ghani<sup>1\*</sup>

<sup>1</sup>Department of Biomedical Science, Kulliyah of Allied Health Sciences, International Islamic University Malaysia, Jalan Istana 25200 Kuantan Pahang Malaysia

### ABSTRACT

Chemoprevention strategies, which aim to prevent or reduce the risk of cancer using natural products, align with the *Maqasid Shariah* by promoting the preservation of life and the protection of health, which are fundamental objectives of Islamic law. This review aimed to understand the role of natural products (plants source) as chemoprevention from *Maqasid Shariah* viewpoint. The study of natural products as chemoprevention and their conceptualization are in parallel with the *Al-Qur'an* and *As-Sunnah* were found through a thorough search of the literature. Chemoprevention is a type of intervention that, in accordance with the first principle of *Maqasid Shariah* which emphasis on the preservation of life (*hifz al-nafs*). Several types of natural products from plant resources mentioned in *Al-Qur'an* and *Al-Hadith* for instance, dates, figs, olive, fennel, acacia, cucumber, pomegranate, ginger, onion, and black cumin possessed medicinal properties for disease treatments and anti-cancer effects. While different cancer types respond differently to natural products as anticancer agents, this review has identified categories of plants with chemopreventive efficacy in parallel with the concept of *Maqasid Shariah* that can serve as a guide for additional in-depth research in the biomedical sciences field.

**Keywords:** chemoprevention, *Maqasid Shariah* perspective, natural products, plants.

### ABSTRAK

Strategi dalam pencegahan kanser bermatlamat untuk mengelakkan serta merendahkan risiko kanser dengan menggunakan sumber semulajadi adalah seiring dengan prinsip *Maqasid Shariah* sebagai asas undang-undang Islam yang mengutamakan kesejahteraan hidup dan memelihara kesihatan. Ulasan kajian ini bermatlamat untuk memahami peranan dan fungsi sumber semulajadi daripada sumber tumbuhan sebagai pencegahan kanser melalui sudut pandang *Maqasid Shariah*. Pencarian dapatan kajian melalui pangkalan data digunakan dan diteliti bagi mencari sumber semulajadi yang mempunyai ciri-ciri pencegah kanser serta perkaitan yang sejajar dengan sumber daripada *Al-Qur'an* dan *Al-Hadis*. Kaedah mencegah kanser adalah suatu intervensi yang selari dengan prinsip *Maqasid Shariah* yang pertama iaitu memelihara keselamatan nyawa (*hifz al-nafs*). Beberapa jenis bahan semulajadi daripada sumber tumbuh-tumbuhan telah dinyatakan dalam *Al-Qur'an* dan *Al-Hadis* seperti buah kurma, buah tin, zaitun, adas, akasia, timun, delima, halia, bawang merah, dan jintan hitam telah didapati mempunyai kebaikan perubatan dalam merawat pelbagai jenis penyakit dan berkesan sebagai anti kanser. Walaupun jenis kanser yang berbeza bertindak balas secara berbeza terhadap produk semula jadi sebagai agen anti kanser, kajian ini telah mengenal pasti kategori tumbuhan dengan keberkesanan pencegah kanser selari dengan konsep *Maqasid Shariah* yang boleh menjadi panduan untuk penyelidikan lebih mendalam dalam bidang sains bioperubatan.

**Kata Kunci:** pencegahankemo, pandangan *Maqasid Shariah*, produk semulajadi, tumbuhan

\*Corresponding author:

**Radiah Abdul Ghani**

Kulliyah of Allied Health Science,  
International Islamic University Malaysia  
Email: radiah@iium.edu.my

## 1.0 INTRODUCTION

Promoting good health and well-being for all is the third indicator of Sustainable Development Goals (SDG) in Malaysia according to the mandate of the United Nations in reaching its agenda in 2030 (*Transforming Our World: The 2030 Agenda for Sustainable Development*, 2015). The global burden of cancer is expected to increase continuously accounting for almost 30,000 mortalities in Malaysia in 2020 (*The Global Cancer Observatory: Malaysia*, 2021). In 2019, cancer contributed to 12.18% of all deaths in the Ministry of Health Malaysia (MOH) hospitals compared with 9.54% in 2004 (*National Strategic Plan for Cancer Control Programme: 2021-2025*, 2021). The Ministry of Health Malaysia (MOH) targeting to overcome the disease by understanding the nature of cancer, its prevention, screening and early diagnosis, treatment, rehabilitation, survivorship, and possible outcomes by ensuring all patients are cared for through holistic approach. Cree (2011) summarized the seven “emblem” of cancer that includes self-sufficiency in growth signals, insensitivity to growth-inhibitory (anti-growth) signals, evasion of programmed cell death (apoptosis), limitless replicative potential, sustained angiogenesis, tissue invasion and altered immunity. Meanwhile, the occurrence of cancer disease had been insinuated through *The Qur'an* (63:8) translated as, “Say (to them): The death from which you flee, that will surely get to you, then you shall be made to return to the All-Knower of the Unseen and the Seen (to Allah). Then (Allah) will inform you of that which you have done,” as malignancies are the results from DNA damage that went through mutations where it eventually escaped the programmed cell death (apoptosis) through *de novo* synthesis and metastasise themselves (El-Khodary, 2018; Mishra *et al.*, 2018).

Whether chemotherapy, surgery, immunotherapy, or radiotherapy are the current mainstream of cancer treatment, they have made significant strides in improving patient outcomes. However, they are not without limitations. Surgery may not be feasible for tumours in critical locations, and chemotherapy and radiation can cause significant side effects and damage to healthy tissues (Tao *et al.*, 2023; Zaer *et al.*, 2023; Zawrzykraj *et al.*, 2023). Cancer cells can develop resistance to targeted therapies over time, limiting their long-term effectiveness. Furthermore, these treatments often do not address the underlying causes of cancer, such as genetic mutations, making it crucial to explore more personalized and innovative approaches to cancer management (Dasari *et al.*, 2023; Davodabadi *et al.*, 2023; Tang *et al.*, 2023). Chemoprevention involves using natural or synthetic chemical agents to suppress or prevent cancer by regulating cell growth, inflammatory effects, antioxidant activity, hormonal signalling, immune response, oncogenic pathways, and DNA repair mechanisms (Penny & Wallace, 2015; Shankar *et al.*, 2022; Tuli *et al.*, 2022). The intervention use of bioactive phytochemicals has shown promising therapeutic benefits because of their non-toxic effects and thus there have been much chemoprevention research focused on agents found in natural products (Singh *et al.*, 2012). Chemoprevention strategies can be divided into three categories: primary, secondary, and tertiary prevention. Primary chemoprevention aims to reduce the risk of cancer in the general population or individuals with heightened risk factors, such as a family history of cancer, advanced age, obesity, or substance use. Secondary chemoprevention, as noted by Li & Sui (2021), is geared toward patients with precancerous lesions that have a likelihood of progressing to invasive disease. In contrast, tertiary chemoprevention focuses on individuals in remission who have already undergone potentially curative treatments but remain at risk of cancer

recurrence. This is considered one of the most challenging aspects of cancer management for patients.

In Islamic context, chemoprevention is equally important as curing the disease as Islam emphasise on the prevention is better than cure concept. This concept is very much in line with the first principle of *Maqasid Syariah*, which is to preserve life (*hifz al-nafs*). From *The Qur'an* (5:32) translated as, "That is why We ordained for the Children of Israel that whoever takes a life—unless as a punishment for murder or mischief in the land—it will be as if they killed all of humanity; and whoever saves a life, it will be as if they saved all of humanity. And indeed, again and again did Our Messengers come to them with clear directives; yet many of them continued to commit excesses," (Abdullah, 2016). Usage of chemoprevention agents is benefitted for patients with cancer remission was not only found to improve quality of life of cancer survivors but also demonstrates cost-effectiveness to reduce the prevalence of cancer on high-risk populations (Masuda *et al.*, 2011; Serrano *et al.*, 2015; Svatek *et al.*, 2008).

Natural products are considered the reservoir of bioactive materials especially phytochemicals for various therapeutics interventions including anti-inflammatory, antioxidant, hepatoprotective effect, anti-cancer and many more. Approximately, 25% of newly approved anti-cancer therapeutics drugs are initiated from natural products including from microbes, plants, marine environments, slime moulds, and other living organisms after detailed extensive clinical studies conducted for its efficacies and side effects (Huang *et al.*, 2021). The Islamic teachings mentioned various types of food that can provide general health benefits as well as disease treatments. *Al-Hadith* from *Al-Bukhari* (*hadith no. 609*), narrated by Said bin Zaid where he heard the Prophet Muhammad

Peace be Upon Him (PBUH) saying, "Truffles are a kind of manna (the plant that grow naturally without human care) and their water heals eye diseases," (Muhammad, 1997). There were several medicinal plants that have been mentioned in the *Al-Qur'an* and *Al-Hadith* that also have been used as traditional remedies and further studied of its chemo preventive agent through *in vitro* and *in vivo* research. This article intended to review the up-to-date knowledge of chemo preventive herbs and spices mentioned in the *Al-Qur'an* which could be a guide for more further investigation chemoprevention agents.

## 2.0 METHODOLOGY

Searches were carried out using Google Scholar, IJUM discovery service-EBSCO, and hand searches (keywords: natural products, herbs, plant, chemoprevention, and anti-cancer, *Maqasid Shariah*, Islamic perspective or Islam or Qur'anic medicine, *Al-Qur'an*, *Sunnah*, or *Al-Hadith*). The references of identified academic journals, the indexes of journals from which articles were retrieved and key reviews were also searched. The publication of two language either English or Bahasa Malaysia were selected for writing up this article. Information used to write this paper was collected from the sources listed in Table 1.

Table 1: Journals sources of information

Sources of information	Year	Search keywords
Google Scholar	2014	Natural products; chemoprevention;
	—	cancer; <i>Maqasid Shariah</i> ; <i>Al-Qur'an</i> ; <i>Al-Hadith</i>
IJUM discovery service-EBSCO	2010	Natural products; chemoprevention;
	—	<i>Maqasid Shariah</i> ; <i>Al-Qur'an</i> or Qur'an or Koran or Qur'an or Kor'an; <i>Al-Hadith</i>

Hand searches of the references of retrieved literature	2006 – 2022	Natural products; chemoprevention; <i>Maqasid Shariah</i> ; <i>Al-Qur'an</i> ; <i>Al-Hadith</i>
---	-------------	---

### 3.0 FINDINGS

#### (A) Prevention of Cancer from *Maqasid Shariah* viewpoints

Cancer remains a significant global public health burden, accounting for the top cause of morbidity, second only to cardiovascular diseases (*WHO Report on Cancer: Setting Priorities, Investing Wisely and Providing Care for All*, 2020). Cancer treatments involving the administration of anti-cancer drugs have become a vast dispute as 90% of chemotherapy failures resulted from drug resistance during metastasis and invasion of cancers (Mansoori *et al.*, 2017). Increasing prevalence of cancer recurrence or death could also occur after five years of chemotherapy as drug resistance impedes the progress of cancer patient's prognosis. As a result, different applications of chemoprevention are suggested to be executed to intercept the development or post-therapeutic recurrence of cancer. This intervention of ameliorate (reduce harm) and essence of healing (promote well-being) literally harmonizes with the Islamic perspective in *Maqasid Shariah* where the concept of human needs already been put forward through the proof reflected in *Usul fiqh* that comes from four sources: *Holy Qur'an*, *As-Sunnah*, *Ijma'* and *Qiyas*. It was also further discussed in *Maqasid Shariah* that realize the way of life of human being which are to protect faith (*Ad-Din*), preserve life (*Al-Nafs*), protect human intellect (*Al-'Aqal*), lineage (*An-Nasl*), and property (*Al-Mal*) (Hashi, 2019). The principle of *Maqasid Shariah* in safeguarding the health from carcinogenesis improving the quality of life viewed to be in complementary with the third goal of Sustainable Development Goals (SDG) as the aim is to develop the

strategy of holistic betterment of human life. Besides, chemoprevention strategy also cost-effective intervention which contributes to reduce diagnosis and treatment cost of malignancy (Gilmartin *et al.*, 2021; Kondo *et al.*, 2009).

A verse from *The Qur'an* (13:4) translated as, "And in the earth are tracts (diverse though) neighbouring, and gardens of vines and fields sown with corn, and palm trees – growing out of single roots or otherwise: watered with the same water, yet some of them We make more excellent than others to eat. Behold, verily in these things there are signs for those who understand!" This verse had accentuated the sign of greatness and power of Allah that variety of plants have their own uniqueness where they contain different nutrition and bioactive compounds that will impart various benefits to human health. Natural product such as herbs and spices have been traditionally used for various treatments as deciphered from ancient Malay Medical Manuscript, Ayurvedic Medicine from India, traditional Chinese medicine, Kampo or Unani. Though the ancient medical knowledge is rooted by the sense of logic and science, the revelations of Holy Qur'an between 610 and 632 CE through The Prophet Muhammad PBUH have also explained that the readily available sources of nutrition from natural products can be used to maintain healthy life as well as to cure diseases. Further discovery of medicinal benefits of natural products have been conducted in various biomedical sciences disciplines *in vitro* and *in vivo*.

Provisionally, the role of natural products to induce cytotoxicity, angiogenesis or apoptosis in cancer cell lines were widely studied as chemoprevention that not directly targeting cancer patients but as preliminary action to prevent the diseases. Moreover, natural products have been scrutinized for its anti-cancer properties as it has great resources of bioactive compounds with therapeutic

potential since half century ago (Khalid *et al.*, 2016). The utmost benefits of natural products as anti-neoplasm are because of low toxicity, minimum side-effects, and off-targets effects. Hence, natural products had its prominence as chemo-protective effect in terms of reducing chemotherapy-associated side effects and enhancing the therapeutic efficacy (Esposito *et al.*, 2019). The Prophet Muhammad PBUH had portray the *Sunnah* that the disease come from compulsive overeating and concomitantly mentioned that the cure can be achieve through healthy diet. This were proved from the *Al-Qur'an* (20:81) and *Al-Hadith* (*hadith no. 592*) narrated by Abu Huraira, I heard Allah's Apostle saying, "There is healing in black cumin for all diseases except death."

### **(B) Classification of Natural Products for Human Health**

Natural products, often derived from plants, animals, marine organism, or microorganisms, encompass a vast array of chemical compounds with diverse structures and biological activities. The classification of natural products is typically based on their chemical composition and sources (Figure 1). These compounds can be broadly categorized into primary metabolites, which are essential for the organism's basic functions, and secondary metabolites, which serve various ecological roles (Barciela *et al.*, 2023; Rai *et al.*, 2023; Yang *et al.*, 2023). Primary metabolites include compounds such as amino acids, nucleotides, and sugars, while secondary metabolites encompass alkaloids, terpenoids, polyketides, and phenolic compounds. These secondary metabolites play crucial roles in defence mechanisms, signalling, and adaptation, making them invaluable resources in drug discovery, agriculture, and various industries. Further subdivisions within natural product classification may focus on the source organism, specific chemical structure, or bioactivity (Ahearne *et al.*,

2021; Ebrahimi & Lante, 2021; Manoharan *et al.*, 2019). These classifications help researchers explore the vast natural product landscape, identify potential therapeutic agents, and gain insights into the ecological and evolutionary significance of these compounds. With advances in analytical techniques and molecular biology, the study of natural products continues to provide valuable insights into the intricacies of life, offering opportunities to improve human health and develop sustainable solutions for various challenges.

In recent years, there has been a growing body of literature focusing on the use of natural compounds for cancer prevention, where natural products have gained considerable attention as potential novel therapeutic strategies in this field. These compounds, originating from various natural sources, can be categorized based on their ability to prevent cancer, their chemical structures, and their mechanisms of action. For instance, some researchers have discovered that several phytochemicals, which are compounds derived from plants like onions, tea leaves, ginger, citrus fruits, and garlic, possess potent anticancer properties that can be further subdivided into various groups, including flavonoids, resveratrol, polyphenols, ellagic acid, carotenoids, and alkaloids (Chen *et al.*, 2023; Sehrawat *et al.*, 2022; Shin *et al.*, 2022). Additionally, terpenoids, another group of compounds found in plants and microorganisms, also showed convincing evidence in cancer prevention. Examples of terpenoids with potential cancer-preventive properties include curcumin from turmeric, known for its anti-inflammatory and antioxidant effects, and taxol from the Pacific yew tree, used in chemotherapy for various cancers such as leukaemia, breast, ovarian, and cervical cancers (Kalantzis *et al.*, 2018; Sun *et al.*, 2016). Conversely, polyamines, small positively charged molecules present in various foods like corn and soybeans,

play a role in cell growth and differentiation and may influence the development of certain cancers, including prostate cancer (Radiiah *et al.*, 2015; Wang *et al.*, 2022). Hence, previous research has recommended avoiding foods with high polyamine content as they could potentially increase the metastasis rate of cancer cells and undermine the effectiveness of cancer patients' chemotherapy. These natural products appear to have diverse roles in cancer prevention strategies, with some originating from plant sources aiding in cancer prevention, while others may hinder the efficiency of cancer treatment.

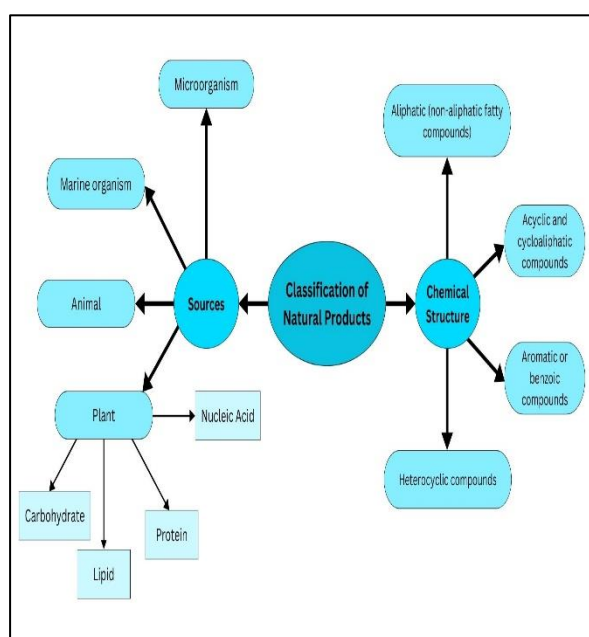
Natural products used in cancer prevention are derived from a wide range of sources, each offering unique bioactive compounds that have the potential to reduce the risk of cancer. Whether obtained from plants, fungi, or marine life, these compounds can be integrated into dietary and lifestyle strategies for cancer prevention, serving as sources of inspiration for the development of new cancer preventive agents in the field of biomedical sciences and cancer research (Dong *et al.*, 2022; Guo *et al.*, 2022; Song *et al.*, 2021). Ibn Al-Qayyim, a medieval Islamic scholar, wrote extensively on various aspects of medicine, including traditional and prophetic medicine. In his writings, he discussed the treatment of ailments, including tumours, based on the guidance from the *Al-Qur'an* and *As-Sunnah* (the teachings and practices of the Prophet Muhammad). There are seven approaches to the treatment of cancers from the perspective of Prophetic Medicine and Islamic tradition (Ibn Al-Qayyim, 2014).

1. **Tawakkul (Reliance on God):** Prophetic Medicine emphasizes the importance of trust in Allah (God) in all aspects of healing. Patients are encouraged to have faith and trust that Allah's will plays a significant role in their recovery (Hamdy, 2009; Rayan, 2018).

2. **Diet and Nutrition:** Ibn al-Qayyim's writings emphasize the importance of a balanced and wholesome diet. Consuming natural and pure foods, free from harmful additives, is encouraged. Fruits, vegetables, and natural remedies are often recommended to support overall health (Muhammad Yusoff & Ab Razak, 2020).
3. **Herbal Remedies:** Prophetic Medicine includes the use of various herbs and natural substances for healing. Ibn al-Qayyim highlighted the benefits of certain herbs and plants, such as black seed (*Nigella sativa*), as potential remedies for various ailments, including tumors (Al-Naggar *et al.*, 2012; Zaid *et al.*, 2010).
4. **Hijama (Cupping Therapy):** Cupping therapy, a traditional practice endorsed by the Prophet Muhammad, involves creating suction on specific points of the body using cups. It is believed to promote circulation and relieve various health issues, including pain and inflammation (Amiruddin *et al.*, 2022; Jahroni, 2020).
5. **Ruqyah (Spiritual Healing):** Islamic tradition includes the practice of *Ruqyah*, which involves reciting specific verses from the *Al-Qur'an* and supplications to seek protection and healing. This spiritual aspect of healing is believed to have a positive impact on one's health and well-being (Ahmad *et al.*, 2016; Mohd Yusoff & Haron, 2010).
6. **Prayer and Supplication:** Regular prayer (*Salat*) and making supplications (*Du'as*) are integral parts of an Islamic lifestyle. These acts of devotion are seen to seek God's assistance in dealing with illnesses, including tumours (Maarof *et al.*, 2023).

7. **Seeking Professional Medical Advice:** Prophetic Medicine does not discourage seeking the expertise of qualified medical professionals. Islamic tradition encourages the use of medical knowledge and treatments alongside faith-based remedies (Latif & Ab. Rahman, 2020; Orayj, 2022).

It's important to note that the approach to treating tumours in Prophetic Medicine is holistic, combining both physical and spiritual elements. Patients are advised to seek a balanced and well-rounded approach to healing that aligns with Islamic principles and guidance. Additionally, individual cases may vary, and consultation with qualified healthcare professionals is recommended when dealing with serious medical conditions like tumours.



**Figure 1:** Classification of Natural Products

### (C) Natural products from plant sources listed in The Qur'an and Al-Hadith with its Chemoprevention Effects

Chemoprevention are permissible human conducts by *Maqasid Shariah* as its set to facilitate positive and good outcomes

in life while it has prohibited conducts that cause harm in all aspects of life. Faradisa & Fakhruddin (2021) summarizes medicinal fruits and vegetables according to the *Al-Qur'an* in a scientific perspective where its bioactive compounds showed several medical benefits including antioxidant, anti-inflammatory, anti-microbial and anti-cancer effects. The author diligently discusses lists of fruits mentioned in the *Al-Qur'an* (cucumber, fig, olive, pomegranate, grape, ginger, dates, and banana) with its phytochemical nutrient contents and its effects on health. The review paper also reported that olive (*O. europaea*), Ginger (*Z. officinale*), banana (*P. granatum*) and fig (*F. carica L.*) was found to have anti-carcinogenic, anti-proliferative and anti-angiogenesis activity on cancer cell lines. The claimed was also in agreement by studies that elaborate the effects of fig, ginger, and olive on different types of cancer cell lines including Colon (HT29, SW260), breast (MCF-7), liver (HepG2 and Huh7), lung (H1299), glioma, pancreatic, prostate, and cervical (HeLa) cancer cells (Castejón *et al.*, 2020; Ridzuan *et al.*, 2019; Shang *et al.*, 2019).

Meanwhile, Wani *et al.* (2011) addresses 10 herbs mentioned in the *Al-Qur'an* and *Al-Hadith* with its medical benefits which are onion, beet root, sweet flag, chicory, garlic, fenugreek, squash, costus, wild thyme, and barley. Although the authors did not specify the anti-cancer properties of those herbs, the uses of herbs as traditional remedies were properly conveyed. However, the chemopreventive effects of onion (*A. cepa L.*) with its important bioactive compounds on breast cancer (MDA-MB-231), glioblastoma (A1235), colorectal cancer (HT-29, HCT116), hepatocellular carcinoma (HepG2), cervical cancer (HeLa) cell lines had been reported in several studies (Fredotovíc *et al.*, 2017; Kumar *et al.*, 2022; Qamariah, 2019). *In vitro* studies also found that fenugreek, wild thyme, and beet root showed cytotoxicity against several

cancer including liver (HepG2), breast (MCF-7), and cervical (WISH) cancer cell lines (Al-Oqail *et al.*, 2013; Berdowska *et al.*, 2013; Das *et al.*, 2016). The detailed bioactive compounds and chemopreventive effects on cancer cell lines were tabulated in Table 2.



**Table 2:** Natural products mentioned in *Al-Qur'an* and *Al-Hadith* with its phytochemical profiles and chemopreventive effects on cancer cell lines.

Natural products ( <i>Scientific name</i> )	Reference from <i>Al-Qur'an</i> or <i>Al-Hadith</i>	Phytochemical profiles/ Bioactive compounds	Chemopreventive effects on cancer cell lines	Reference
<b>Ginger</b> ( <i>Z. officinale</i> )	<i>The Qur'an</i> (76:17)	Gingerols, shogaols, paradols, quercetin, zingerone, gingerenone-A, 6-dehydrogingerdione, terpene	Breast, cervical, colorectal, liver (HepG2), pancreatic, and prostate cancer	Mao <i>et al.</i> (2019); Ridzuan <i>et al.</i> (2019)
<b>Black cumin</b> ( <i>N. sativa</i> )	<i>Al-Bukhari</i> ( <i>hadith</i> no. 5687)	Thymoquinone, thymohydroquinone, dithymoquinone (DIM), 4-terpineol, carvacrol, carvone, t-anethol, $\alpha$ -pinene, thymol, $\alpha$ -hederin, limonene, nigellicine, nigellidine, nigellicimine, nigellicimine-N-oxide, oleic acid, linolenic acid, linoleic acid, eicodadienoic acid, arachidic acid, palmitoleic acid, palmitic acid, stearic acid and myristic acid	Lung (A549), liver (HepG2), breast (MCF-7), colon, renal, cervical cancer (HeLa and SiHa), pancreatic ductal adenocarcinoma, leukemia (HL-60)	Mohamad <i>et al.</i> (2018); Shafiq <i>et al.</i> (2014)
<b>Garlic</b> ( <i>Allium sativum</i> )	<i>The Qur'an</i> (2: 61)	Allicin, alliin, diallyl sulfide, diallyl disulfide, diallyl trisulfide, ajoene, S-allyl-cysteine, $\beta$ -resorcylic acid, pyrogallol, gallic acid, rutin, protocathechuic acid, and quercetin	Liver (HepG2), colon (Caco2), prostate (PC-3), and breast (MCF-7 and MDA-MB-231), ovarian (A2780) cancer cells	Shang <i>et al.</i> (2019); Wani <i>et al.</i> (2011)
<b>Onion</b> ( <i>Allium cepa</i> L.)	<i>The Qur'an</i> (2: 61)	Quercetin, myricetin, isorhamnetin, kaempferol, vanillic acid, catechin, epicatechin, p-coumaric acid, ferulic acid, protocathechuic acid, p-hydroxybenzoic acid, cyanidin, morin,	Breast cancer (MDA-MB-231), glioblastoma (A1235), colorectal cancer (HT-29, HCT116), liver (HepG2), cervical cancer (HeLa)	Fredotović <i>et al.</i> (2017); Kumar <i>et al.</i> (2022); Qamariah (2019); Wani <i>et al.</i> (2011)

Natural products ( <i>Scientific name</i> )	Reference from <i>Al-Qur'an</i> or <i>Al-Hadith</i>	Phytochemical profiles/ Bioactive compounds	Chemopreventive effects on cancer cell lines	Reference
		resveratrol, naringenin, mormoreol, naringenin		
<b>Cucumber (<i>C. sativus</i>)</b>	<i>The Qur'an</i> (2: 61)	Tannins, polyphenols, phenols, cyanogenic glycosides, anthocyanins, glycosides, saponins, alkaloid, flavonoids, terpenoids, resins, chlorophyll, steroids, reducing sugars and uronic acid.	Cervical (HeLa) and breast (MCF-7) cancer cells.	(Khafagi <i>et al.</i> , 2006; Tuama & Mohammed, 2019; Uthpala <i>et al.</i> , 2020)
<b>Fennel (<i>F. vulgare</i>)</b>	<i>The Qur'an</i> (2: 61)	Acetic acid, anisaldehyde, ascorbic acid, camphor, carvone, chlorogenic acid, D-limonene, eicosamethyl- cyclodecasiloxane, estragole, eugenol, fenchone, linoleic acid, margaric acid, myrecene, myristic acid, oleic acid, palmitic acid, phenylethylamine, quercetin, stearic acid, $\alpha$ -pinene, $\alpha$ - terpineol, $\gamma$ -asarone, and $\gamma$ -terpinene	Liver (HepG2), breast (MCF-7, MDA-MB-362, MDA-MB-231), colon (HT29), colorectal, cervical, pancreatic (SNU- 213), oral (Ca9-22), mammary, prostate, gastric (HGC-27), stomach, and lung (A549) cancer cells	Kaur <i>et al.</i> (2022); Qamariah (2019)
<b>Olive (<i>O. europaea</i>)</b>	<i>The Qur'an</i> (95: 1-3)	Oleuropein (OL), dimethyl-OL, and ligstroside secoiridoids, OL-aglycone, oleocanthal, oleacein, elenolate, oleoside-11-methyl ester, elenoic acid, hydroxytyrosol, and tyrosol	Colon (HT29, SW260), breast (MCF-7), liver (HepG2 and Huh7), lung (H1299), glioma, and cervical (HeLa) cancer cells	Castejón <i>et al.</i> (2020); Faradisa & Fakhruddin (2021)

Natural products ( <i>Scientific name</i> )	Reference from <i>Al-Qur'an</i> or <i>Al-Hadith</i>	Phytochemical profiles/ Bioactive compounds	Chemopreventive effects on cancer cell lines	Reference
<b>Acacia</b> ( <i>Acacia catechu</i> Willd.)	<i>The Qur'an</i> (56: 27 – 35)	Catechins, epicatechins, ellagic acid, rutin, quercetin, gallic acid, chlorogenic acid umbelliferone, kaempferol, coumaric acid, caffeic acid, camphor, phytol, vitamin E acetate, fisetinidol, hexadecane, caryatin, and baicalein	Human oral squamous cell carcinoma (SCC-25), breast (MCF-7), colorectal (HT-29), human lung (A549), colon (HCT-16, Colo-205), leukemia (THP-1, HL-60 and K562), prostate (PC-3), and liver (HepG2) cancer cells	Adhikari <i>et al.</i> (2021); Chiaino <i>et al.</i> (2020); Qamariah (2019)
<b>Pomegranate</b> ( <i>Punica granatum</i> Linn.)	<i>The Qur'an</i> (55:68)	Alkaloids, flavonoids, tannins, phenols, phytosterol, cardiac glycosides, saponins, and phlobatannins, anthocyanins	Human colon cancer (Hct116), breast cancer (MCF-7, Hs578T), prostate cancer, cervical cancer (HeLa), liver (HepG2)	Eroglu Ozkan <i>et al.</i> , (2021); González <i>et al.</i> , (2023); Habchi <i>et al.</i> , (2023); Kiraz <i>et al.</i> , (2016)

Furthermore, other paper highlights the plants and herbs according to *Al-Qur'an* and *Al-Hadith* by classifying the lists according to the food groups which are bread and grains; fruits and vegetables; meat and poultry; beans; and milk and dairy products (Aslam, 2021). The paper also specifically focuses on functional foods with evidence from Islamic sources by relating them with crucial phytochemical properties and its health benefits supported by medical research. The majority of plants and herbs mentioned contains metabolites that have antioxidant, anti-carcinogenic, anti-proliferative properties and free-radical scavenging activities on cancer cells while protecting the functions and genetic materials of normal cells. Hossain *et al.* (2016) also had discussed the lists of natural products from the *Al-Qur'an* and revealed that there are 27 medicinal plants species where they classified them into six categories: tree, forage plant, fruits, aromatic plants, crops and vegetables. The chemopreventive properties from certain plants were also specified which are sweet basil (*O. basilicum* L.) and Indian jujube (*Z. mauritiana* L.). Although the papers did not critically discuss the natural products as chemoprevention from the *Al-Qur'an* and *Al-Hadith*, which are the main interest of this review, we agree that the other healing benefits of natural products should not be abandoned, as they are typically consumed for various purposes.

In the review paper by Zaid *et al.* (2010), the Arabic Muslim scholars agreed that the first cancer treatment strategy is to prevent further growth of malignant cells and the disease must be identified as early as possible. However, cancer resistance had also been admitted being the major challenges in treating cancer as Ibn Sina stated that strong medication will trigger the cancer evil. He also interpreted the Prophet Muhammad PBUH words by *Sahih Al-Bukhari*, (*Al-Hadith* no. 592) by describing four approaches to treat cancer which are tumour cell arrest, preventing the

progression, improving the diet and directly targeting involved organ with known effective medicine (Zarshenas & Bardbori, 2017). The concept of Greco-Arab and Islamic herbal medicine, as expounded by renowned Muslim physicians such as Al-Razi, Ibn Sina, Al-Zahrawi, and Ibn Al-Nafis, also outlined cancer treatment and prevention using natural products, drawing from the *Al-Qur'an* and *Al-Hadith* as sources. Since dietary intake plays a crucial role in bodily health, Arab-Islamic treatments of cancers describe six characteristics of natural products that could potentially target cells when using herbal cancer remedies. These include showing cell cycle arrest, antioxidant properties, apoptosis induction, angiogenesis inhibition, anti-inflammatory effects, and the modulation of signal transduction pathways. Moreover, Zaid *et al.* (2010) also provides chemoprevention properties of several natural products including garlic, onion, black seed, pomegranate, olive, and bread wheat.

On the other hand, the Prophetic Medicine by Ibn Al-Qayyim, which is a branch of Islamic traditional medicine based on the teachings of the Qur'an and Sunnah listed several types of natural products (Ibn Qayyim, 2014).

1. **Honey:** *The Qur'an* (16:68) translated as, "And your Lord inspired to the bee, 'Take for yourself among the mountains, houses, and among the trees and [in] that which they construct.'" Moreover, Jabir bin Abdullah narrated that, the Prophet PBUH saying, "If there is any healing in your medicines, then it is in cupping, a gulp of honey or branding with fire (cauterization) that suits the ailment, but I don't like to be (cauterized) branded with fire," (*Al-Bukhari*, no. 587). Several studies investigated that honey could disrupt carcinogenesis process in endometrial, skin, cervical, kidney, prostate, bladder, oral and bone cancer cells (Bouali *et al.*,

2023; Qanash *et al.*, 2023; Sumarlin *et al.*, 2023).

2. **Black cumin (*Nigella Sativa*):** The Prophet PBUH said, "In the black seed, there is healing for every disease except death," (*Al-Bukhari*, no. 5687).
3. **Olive Oil:** "Allah is the light of the heavens and the earth. The example of His light is like a niche within which is a lamp, the lamp is within glass, the glass as if it were a pearly [white] star, lit from [the oil of] a blessed olive tree, neither of the east nor of the west, whose oil would almost glow even if untouched by fire," (The Qur'an, 24:35).
4. **Dates:** The Prophet PBUH said, "If somebody takes some Ajwa dates every morning, he will not be affected by poison or magic on that day until night," (*Al-Bukhari*, no. 663). Previous studies found that Ajwa dates induced apoptosis in several cancer cell lines, including hepatocellular carcinoma, prostate, and breast cancer (AlMalki, 2021; F. Khan *et al.*, 2016; M. A. Khan *et al.*, 2021; Mirza *et al.*, 2018).
5. **Zamzam Water:** The Prophet PBUH said, "The water of Zamzam is good for whatever it is drunk for," (*Ibn Majah*: 3062). Several studies found that Zamzam water showed cytotoxicity and anticancer effects against human colon, breast, lung, and uterine cancer cell lines (Abd-Rabou *et al.*, 2018; Al Zahrani *et al.*, 2019; Omar *et al.*, 2017).
6. **Camel's Milk:** The Prophet PBUH recommended the consumption of camel's milk for its health benefits. As narrated by Anas, "Some people were sick and they said, 'O Allah's Apostle! Give us shelter and food. So, when they became healthy, they said, 'The weather of Medina is not suitable for us.' So, he sent them to *Al-Harra* with some she-camels of his and said, 'Drink of their milk.' But when they became healthy, they killed the shepherd of the Prophet and drove away his camels. The Prophet sent some people in their pursuit. Then

he got their hands and feet cut and their eyes were branded with heated pieces of iron. I saw one of them licking the earth with his tongue till he died," (*Al-Bukhari*, *hadith* no. 589). Recent *in vitro* evidence suggests that camel's milk functions as a potent antifungal, antibacterial, and exhibits anticancer effects on colorectal, fibrosarcoma, and breast cancer (Krishnankutty *et al.*, 2018; Murali *et al.*, 2021; Shaban *et al.*, 2023).

#### 4.0 CONCLUSION

The principles of Maqasid Al-Shariah in healthcare practices have been implemented through early Muslim physicians where the fundamental of protecting life of human as the essential aim by preventing harms and maintaining good health. Chemoprevention is the intervention that fit the principles of *Maqasid Shariah* where various natural products can be utilized as the blocking or suppressing agents in three pathways during initiation, promotion, and progression of cancer. The *Al-Qur'an* and *Al-Hadith* had also provided several medicinal plants that have been studied for its variety of medical benefits including as chemoprevention. Generally, most of the plants, fruits or herbs mentioned in the Islamic sources had gone through extensive cancer research in the biomedical sciences area where the findings provide valuable information in better management of diet among cancer patients as well as individuals with susceptible risks of developing cancers.

#### ACKNOWLEDGMENT

The authors are grateful for the publication's support from the Fundamental Research Grant Scheme of the Ministry of Higher Education (MOHE) of Malaysia (FRGS/1/2021/SKK0/UIAM/02/8).

## REFERENCES

- Abd-Rabou, A. A.-R., Assirey, E. A.-R., Saad, R., & Ibrahim, H. S. (2018). Metalloenes-induced apoptosis in human hepatic cancer HepG2 cells: The prodigy of Zamzam water. *International Journal of Pharmacology*, 14(2), 260–270. <https://doi.org/10.3923/ijp.2018.260.270>
- Abdullah, Y. A. (2016). *The Meaning of the Holy Qur'an. Translation and Commentary by Abdullah Yusuf Ali*. The Islamic Foundation.
- Adhikari, B., Aryal, B., & Bhattarai, B. R. (2021). A Comprehensive Review on the Chemical Composition and Pharmacological Activities of Acacia catechu (L.f.) Willd. *Journal of Chemistry*, 2021. <https://doi.org/10.1155/2021/2575598>
- Ahearne, A., Albataineh, H., Dowd, S. E., & Stevens, D. C. (2021). Assessment of evolutionary relationships for prioritization of myxobacteria for natural product discovery. *Microorganisms*, 9(7). <https://doi.org/10.3390/microorganisms9071376>
- Ahmad, K., Ramli, M. A., & Rahman, N. A. A. (2016). Understanding the Use of Ruqyah (Healing Method Based on The Qur'an and Hadith) in the Treatment of Disease: Analysis based on Fiqh al-Hadith Al-Imam Al-Bukhari. *Al-Bayan: Journal of Qur'an and Hadith Studies*, 14(2), 168–205. <https://doi.org/https://doi.org/10.1163/22321969-12340038>
- Al Zahrani, S., Omar, U., Rahimulddin, S., Al-Ghafari, A., Aldahlawi, A., & Al Doghaither, H. (2019). Antiproliferative and apoptotic effects of the natural alkaline water (Zamzam) in breast cancer cell line MCF-7. *Journal of Cancer Research and Therapeutics*, 15(5), 1098–1104. [https://doi.org/10.4103/jcrt.JCRT\\_381\\_17](https://doi.org/10.4103/jcrt.JCRT_381_17)
- AlMalki, F. A. (2021). Cytotoxic Activities of Phytochemical Components from Ethanol Extract of Ajwa Date on Human Hepatoma Cancer Cells in Vitro. *Pharmacognosy Journal*, 13(6), 1664–1672. <https://doi.org/10.5530/pj.2021.13.214>
- Al-Naggar, R. A., Bobryshev, Y. V., Abdulghani, M. A.-M. M., Rammohan, S., & Al-Jashamy, K. (2012). Knowledge and Perceptions of Cancer and Cancer Prevention among Malaysian Traditional Healers: a Qualitative Study. *Asian Pacific Journal of Cancer Prevention*, 13(8), 3841–3850. <https://doi.org/10.7314/APJCP.2012.13.8.3841>
- Al-Oqail, M. M., Farshori, N. N., Al-Sheddi, E. S., Musarrat, J., Al-Khedhairi, A. A., & Siddiqui, M. A. (2013). In vitro cytotoxic activity of seed oil of fenugreek against various cancer cell lines. *Asian Pacific Journal of Cancer Prevention*, 14(3), 1829–1832. <https://doi.org/10.7314/APJCP.2013.14.3.1829>
- Amiruddin, M., Syafitri, L. I., Rabbani, A., Muthmainnah, A. K., & Salsabila, A. T. (2022). The Benefits of Removing Dirty Blood with Traditional Cupping Treatment. *Proceedings of International Pharmacy Ulul Albab Conference and Seminar (PLANAR)*, 2, 60.

- <https://doi.org/10.18860/planar.v2i0.2>  
127
- Aslam, M. (2021). Ethnomedicinal Effects of Plants and Herbs Mentioned in Holy Qur'an and Hadith. *Journal of Islamic and Religious Studies*, 6(2), 15–38.  
<https://doi.org/10.36476/jirs.6:2.12.20>  
21.11
- Barciela, P., Perez-Vazquez, A., & Prieto, M. A. (2023). Azo dyes in the food industry: Features, classification, toxicity, alternatives, and regulation. *Food and Chemical Toxicology*, 178. <https://doi.org/10.1016/j.fct.2023.113935>
- Berdowska, I., Zieliński, B., Fecka, I., Kulbacka, J., Saczko, J., & Gamian, A. (2013). Cytotoxic impact of phenolics from Lamiaceae species on human breast cancer cells. *Food Chemistry*, 141(2), 1313–1321. <https://doi.org/10.1016/j.foodchem.2013.03.090>
- Bouali, N., Hamadou, W. S., Badraoui, R., Lajimi, R. H., Hamdi, A., Alreshidi, M., Adnan, M., Soua, Z., Siddiqui, A. J., Noumi, E., & Snoussi, M. (2023). Phytochemical Composition, Antioxidant, and Anticancer Activities of Sidr Honey: In Vitro and In Silico Computational Investigation. *Life*, 13(1). <https://doi.org/10.3390/life13010035>
- Castejón, M. L., Montoya, T., Alarcón-de-la-lastra, C., & Sánchez-hidalgo, M. (2020). Potential protective role exerted by secoiridoids from *olea europaea* L. In cancer, cardiovascular, neurodegenerative, aging-related, and immunoinflammatory diseases. *Antioxidants*, 9(2). <https://doi.org/10.3390/antiox9020149>
- Chen, Y., Liao, X., Li, Y., Cao, H., Zhang, F., Fei, B., Bao, C., Cao, H., Mao, Y., Chen, X., Gao, X., Zhao, W., & Xu, J. (2023). Effects of prebiotic supplement on gut microbiota, drug bioavailability, and adverse effects in patients with colorectal cancer at different primary tumor locations receiving chemotherapy: study protocol for a randomized clinical trial. *Trials*, 24(1). <https://doi.org/10.1186/s13063-023-07137-y>
- Chiaino, E., Micucci, M., Durante, M., Budriesi, R., Gotti, R., Marzetti, C., Chiarini, A., & Frosini, M. (2020). Apoptotic-induced effects of acacia catechu willd. Extract in human colon cancer cells. *International Journal of Molecular Sciences*, 21(6). <https://doi.org/10.3390/ijms21062102>
- Cree, I. A. (2011). Cancer Biology. In I. A. Cree (Ed.), *Cancer Cell Culture: Methods and Protocols* (Second, pp. 1–13). Springer. [www.springer.com/series/7651](http://www.springer.com/series/7651)
- Das, S., Filippone, S. M., Williams, D. S., Das, A., & Kukreja, R. C. (2016). Beet root juice protects against doxorubicin toxicity in cardiomyocytes while enhancing apoptosis in breast cancer cells. *Molecular and Cellular Biochemistry*, 421(1–2), 89–101. <https://doi.org/10.1007/s11010-016-2789-8>
- Dasari, S., Pathak, N., Thomas, A., Bitla, S., Kumar, R., & Munirathinam, G. (2023). Neferine Targets the Oncogenic Characteristics of Androgen-Dependent Prostate Cancer Cells via Inducing Reactive Oxygen Species. *International Journal of Molecular Sciences*, 24(18).

- <https://doi.org/10.3390/ijms241814242>
- Davodabadi, F., Sajjadi, S. F., Sarhadi, M., Mirghasemi, S., Nadali Hezaveh, M., Khosravi, S., Kamali Andani, M., Cordani, M., Basiri, M., & Ghavami, S. (2023). Cancer chemotherapy resistance: Mechanisms and recent breakthrough in targeted drug delivery. *European Journal of Pharmacology*, 958. <https://doi.org/10.1016/j.ejphar.2023.176013>
- Dong, S., Guo, X., Han, F., He, Z., & Wang, Y. (2022). Emerging role of natural products in cancer immunotherapy. In *Acta Pharmaceutica Sinica B* (Vol. 12, Issue 3). <https://doi.org/10.1016/j.apsb.2021.08.020>
- Ebrahimi, P., & Lante, A. (2021). Polyphenols: A comprehensive review of their nutritional properties. *Open Biotechnology Journal*, 15(1), 164–172. <https://doi.org/10.2174/1874070702115010164>
- El-Khodary, M. S. M. (2018). Qur’anic Verse No. 8 of Surat Al-Jumu’ah Describes Cancer as a Complete and Accurate Description and Leads Us to Determine the True Cause of Cancer. “Part-1.” *CellBio*, 07(01), 1–11. <https://doi.org/10.4236/cellbio.2018.71001>
- Eroglu Ozkan, E., Seyhan, M. F., Kurt Sirin, O., Yilmaz- Ozden, T., Ersoy, E., Hatipoglu Cakmar, S. D., Goren, A. C., Yilmaz Aydogan, H., & Ozturk, O. (2021). Antiproliferative effects of Turkish pomegranate (*Punica granatum* L.) extracts on MCF-7 human breast cancer cell lines with focus on antioxidant potential and bioactive compounds analyzed by LC-MS/MS. *Journal of Food Biochemistry*, 45(9). <https://doi.org/10.1111/jfbc.13904>
- Esposito, S., Bianco, A., Russo, R., di Maro, A., Isernia, C., & Pedone, P. V. (2019). Therapeutic Perspectives of Molecules from *Urtica dioica* Extracts for Cancer Treatment. In *Molecules* (Vol. 24, Issue 15). MDPI AG. <https://doi.org/10.3390/molecules24152753>
- Faradisa, E., & Fakhruddin, A. (2021). Beberapa Tumbuhan Obat Di Dalam Al-Qur’an Ditinjau Dari Perspektif Sains. *Nusantara: Jurnal Pendidikan Dan Ilmu Sosial*, 3(1), 1–19. <https://ejournal.stitpn.ac.id/index.php/nusantara>
- Fredotović, Ž., Šprung, M., Soldo, B., Ljubenković, I., Budić-Leto, I., Bilušić, T., Cikeš-Čulić, V., & Puizina, J. (2017). Chemical Composition and Biological activity of *allium cepa* L. and *Allium × cornutum* (Clementi ex Visiani 1842) Methanolic extracts. *Molecules*, 22(3). <https://doi.org/10.3390/molecules22030448>
- Gilmartin, C., Nonvignon, J., Cairns, M., Milligan, P., Bocoum, F., Winskill, P., Moroso, D., & Collins, D. (2021). Seasonal malaria chemoprevention in the Sahel subregion of Africa: a cost-effectiveness and cost-savings analysis. *The Lancet Global Health*, 9(2), e199–e208. [https://doi.org/10.1016/S2214-109X\(20\)30475-7](https://doi.org/10.1016/S2214-109X(20)30475-7)
- González-González, G. M., Esparza-González, S. C., Nery-Flores, S. D., Morlett-Chávez, J. A., Ascacio-Valdés, J. A., Flores-Gallegos, A. C., Saenz-Galindo, A., & Rodríguez-



- Herrera, R. (2023). Anticancer activity of polyphenolic Punica granatum peel extracts obtained by hybrid ultrasound-microwave assisted extraction: Evaluation on HeLa and HepG2 cells. *Environmental Quality Management*.  
<https://doi.org/10.1002/tqem.22077>
- Guo, M., Jin, J., Zhao, D., Rong, Z., Cao, L. Q., Li, A. H., Sun, X. Y., Jia, L. Y., Wang, Y. Di, Huang, L., Li, Y. H., He, Z. J., Li, L., Ma, R. K., Lv, Y. F., Shao, K. K., & Cao, H. L. (2022). Research Advances on Anti-Cancer Natural Products. In *Frontiers in Oncology* (Vol. 12).  
<https://doi.org/10.3389/fonc.2022.866154>
- Habchi, C., Badran, A., Srour, M., Daou, A., Baydoun, E., Hamade, K., & Hijazi, A. (2023). Determination of the Antioxidant and Antiproliferative Properties of Pomegranate Peel Extract Obtained by Ultrasound on HCT-116 Colorectal Cancer Cell Line. *Processes*, 11(4).  
<https://doi.org/10.3390/pr11041111>
- Hamdy, S. F. (2009). Islam, Fatalism, and Medical Intervention: Lessons from Egypt on the Cultivation of Forbearance (Sabr) and Reliance on God (Tawakkul). *Anthropological Quarterly*, 82(1), 173–196.  
<http://www.jstor.org/stable/25488262>
- Hashi, A. A. (2019). The Applications of Maqasid Al-Shari'ah in Medicine: An Overview. *Revelation and Science*, 9(2), 1–20.
- Hossain, M. S., Urbi, Z., Evamoni, F. Z., & Zohora, F. T. (2016). A Secondary Research on Medicinal Plants Mentioned in the Holy Qur'an Medicinal plants of Bangladesh View project Salinity Stress in Plants View project. *Journal of Medicinal Plants*, 15(59).  
<https://www.researchgate.net/publication/309319916>
- Huang, M., Lu, J. J., & Ding, J. (2021). Natural Products in Cancer Therapy: Past, Present and Future. In *Natural Products and Bioprospecting* (Vol. 11, pp. 5–13). Springer.  
<https://doi.org/10.1007/s13659-020-00293-7>
- Ibn Qayyim, A.-J. (2014). *The Prophetic Medicine* (A. Abdul Rahman, Ed.). Darussalam.
- Jahroni, J. (2020). Prophet's Medicine among The Contemporary Indonesian Salafi Groups. *Epistemé: Jurnal Pengembangan Ilmu Keislaman*, 15(02), 315–343.  
<https://doi.org/10.21274/epis.2020.15.02.315-343>
- Kalantzis, E. D., Scorilas, A., & Vassilacopoulou, D. (2018). Evidence for L-Dopa decarboxylase involvement in cancer cell cytotoxicity induced by docetaxel and mitoxantrone. *Current Pharmaceutical Biotechnology*, 19(13), 1087–1096.  
<https://doi.org/10.2174/1389201019666181112103637>
- Kaur, B., Rolta, R., Salaria, D., Kumar, B., Fadare, O. A., da Costa, R. A., Ahmad, A., Al-Rawi, M. B. A., Raish, M., & Rather, I. A. (2022). An In Silico Investigation to Explore Anti-Cancer Potential of Foeniculum vulgare Mill. Phytoconstituents for the Management of Human Breast Cancer. *Molecules*, 27(13).  
<https://doi.org/10.3390/molecules27134077>
- Khafagi, I., Zakaria, A., Dewedar, A., & El-Zahdany, K. (2006). A voyage in the

- world of plants as mentioned in the Holy Qur'an. *International Journal of Botany*, 2(3), 242–251. <https://doi.org/10.3923/ijb.2006.242.251>
- Khalid, E. B., Ayman, E. L. M. E. L. K., Rahman, H., Abdelkarim, G., & Najda, A. (2016). Natural products against cancer angiogenesis. *Tumor Biology*, 37(11), 14513–14536. <https://doi.org/10.1007/s13277-016-5364-8>
- Khan, F., Ahmed, F., Pushparaj, P. N., Abuzenadah, A., Kumosani, T., Barbour, E., AlQahtani, M., & Gauthaman, K. (2016). Ajwa Date (*Phoenix dactylifera* L.) extract inhibits human breast adenocarcinoma (MCF7) cells in vitro by inducing apoptosis and cell cycle arrest. *PLoS ONE*, 11(7). <https://doi.org/10.1371/journal.pone.0158963>
- Khan, M. A., Siddiqui, S., Ahmad, I., Singh, R., Mishra, D. P., Srivastava, A. N., & Ahmad, R. (2021). Phytochemicals from Ajwa dates pulp extract induce apoptosis in human triple-negative breast cancer by inhibiting AKT/mTOR pathway and modulating Bcl-2 family proteins. *Scientific Reports*, 11(1). <https://doi.org/10.1038/s41598-021-89420-z>
- Kiraz, Y., Neergheen-Bhujun, V. S., Rummun, N., & Baran, Y. (2016). Apoptotic effects of non-edible parts of *Punica granatum* on human multiple myeloma cells. *Tumor Biology*, 37(2), 1803–1815. <https://doi.org/10.1007/s13277-015-3962-5>
- Kondo, M., Hoshi, S. L., & Toi, M. (2009). Economic evaluation of chemoprevention of breast cancer with tamoxifen and raloxifene among high-risk women in Japan. *British Journal of Cancer*, 100(2), 281–290. <https://doi.org/10.1038/sj.bjc.6604869>
- Krishnankutty, R., Iskandarani, A., Therachiyil, L., Uddin, S., Azizi, F., Kulinski, M., Bhat, A. A., & Mohammad, R. M. (2018). Anticancer activity of camel milk via induction of autophagic death in human colorectal and breast cancer cells. *Asian Pacific Journal of Cancer Prevention*, 19(12), 3501–3509. <https://doi.org/10.31557/APJCP.2018.19.12.3501>
- Kumar, M., Barbhai, M. D., Hasan, M., Punia, S., Dhumal, S., Radha, Rais, N., Chandran, D., Pandiselvam, R., Kothakota, A., Tomar, M., Satankar, V., Senapathy, M., Anitha, T., Dey, A., Sayed, A. A. S., Gadallah, F. M., Amarowicz, R., & Mekhemar, M. (2022). Onion (*Allium cepa* L.) peels: A review on bioactive compounds and biomedical activities. *Biomedicine and Pharmacotherapy*, 146. <https://doi.org/10.1016/j.biopha.2021.112498>
- Latif, M. A., & Ab. Rahman, S. (2020). Knowledge and Attitude on Halal Food and Islamic Eating Practices among Students of Universiti Malaysia Sabah. *JOURNAL OF HALAL INDUSTRY & SERVICES*. <https://doi.org/10.36877/jhis.a0000166>
- Li, B., & Sui, L. (2021). Metabolic reprogramming in cervical cancer and metabolomics perspectives. *Nutrition and Metabolism*, 18(1), 1–14. <https://doi.org/10.1186/s12986-021-00615-7>

- Maarof, S. R., Ahmad, C. A., Atkins, L., Devol, E. B., Hussain, A., & Abdullah, K. L. (2023). The Effects of Listening to the Qur'an in the Postoperative Management of the Patients Undergoing Laparoscopic Cholecystectomy in the Day Surgery Unit. *Journal of PeriAnesthesia Nursing*, 38(1), 58–62. <https://doi.org/10.1016/j.jopan.2022.02.006>
- Manoharan, G., Sairam, T., Thangamani, R., Ramakrishnan, D., K.Tiwari, M., Lee, J.-K., & Marimuthu, J. (2019). Identification and characterization of type III polyketide synthase genes from culturable endophytes of ethnomedicinal plants. *Enzyme and Microbial Technology*, 131. <https://doi.org/10.1016/j.enzmictec.2019.109396>
- Mansoori, B., Mohammadi, A., Davudian, S., Shirjang, S., & Baradaran, B. (2017). The Different Mechanisms of Cancer Drug Resistance: A Brief Review. *Advanced Pharmaceutical Bulletin*, 7(3), 339–348. <https://doi.org/10.15171/apb.2017.041>
- Mao, Q. Q., Xu, X. Y., Cao, S. Y., Gan, R. Y., Corke, H., Beta, T., & Li, H. bin. (2019). Bioactive compounds and bioactivities of ginger (zingiber officinale roscoe). *Foods*, 8(6). <https://doi.org/10.3390/foods8060185>
- Masuda, M., Wakasaki, T., Toh, S., Shimizu, M., & Adachi, S. (2011). Chemoprevention of head and neck cancer by green tea extract: EGCG-the role of EGFR signaling and “lipid raft.” *Journal of Oncology*, 2011. <https://doi.org/10.1155/2011/540148>
- Mirza, M. B., Elkady, A. I., Al-Attar, A. M., Syed, F. Q., Mohammed, F. A., & Hakeem, K. R. (2018). Induction of apoptosis and cell cycle arrest by ethyl acetate fraction of Phoenix dactylifera L. (Ajwa dates) in prostate cancer cells. *Journal of Ethnopharmacology*, 218, 35–44. <https://doi.org/10.1016/j.jep.2018.02.030>
- Mishra, A. P., Salehi, B., Sharifi-Rad, M., Pezzani, R., Kobarfard, F., Sharifi-Rad, J., & Nigam, M. (2018). Programmed Cell Death, from a Cancer Perspective: An Overview. *Molecular Diagnosis and Therapy*, 22(3), 281–295. <https://doi.org/10.1007/s40291-018-0329-9>
- Mohamad, A. A., Syukran Baharuddin, A., & Ruskam, A. (2018). *International Journal of Islamic and Civilizational Studies Healthy Lifestyle Education from Halal Nutraceutical Concept Article history*. <http://jurnalumran.utm.my/index.php/umran>
- Mohd Yusoff, M. Y. @ Z., & Haron, Z. (2010). Al-Imam Ibn Qayyim (691-751h/1292- 1350m): Sorotan Terapi Ruqyah dalam Pemikiran Perubatan. *Jurnal Usuluddin*, 32(0), 19–50. <https://ejournal.um.edu.my/index.php/JUD/article/view/7390>
- Muhammad, M. K. (1997). *Translation of Sahih Bukhari*. Darussalam.
- Muhammad Yusoff, M. F., & Ab Razak, N. I. (2020). Medieval Theoretical Principles of Medicine in Ibn Sīnā's al-Qānūn fī al-Ṭibb and al-Dhahabī's al-Ṭibb al-Nabawī. *Jurnal Akidah & Pemikiran Islam*, 22(2), 119–154. <https://doi.org/10.22452/afkar.vol22no2.4>
- Murali, C., Mudgil, P., Gan, C.-Y., Tarazi, H., El-Awady, R., Abdalla, Y., Amin,

- A., & Maqsood, S. (2021). Camel whey protein hydrolysates induced G2/M cellcycle arrest in human colorectal carcinoma. *Scientific Reports*, 11(1). <https://doi.org/10.1038/s41598-021-86391-z>
- National Strategic Plan for Cancer Control Programme: 2021-2025. (2021). <http://www.moh.gov.my>
- Omar, U. M., Al Doghaither, H. A., Rahimulddin, S. A., Al Zahrani, S. M., & Al-Ghafari, A. B. (2017). In vitro cytotoxic and anticancer effects of zamzam water in human lung cancer (A594) cell line. *Malaysian Journal of Medical Sciences*, 24(3), 15–25. <https://doi.org/10.21315/mjms2017.24.3.3>
- Orayj, K. B. (2022). Prophetic Medicine: Building an Epistemological Framework to Overcome the Conflict between Religion and Evidence-Based Medicine. *European Journal of Natural Sciences and Medicine*, 5(1), 44. <https://doi.org/10.26417/785qsr64>
- Penny, L. K., & Wallace, H. M. (2015). The challenges for cancer chemoprevention. *Chemical Society Reviews*, 44(24), 8836–8847. <https://doi.org/10.1039/c5cs00705d>
- Qamariah, N. (2019). Ethnobotanical study of Quràn Plants. *Pharmacognosy Journal*, 11(5), 919–928. <https://doi.org/10.5530/pj.2019.11.147>
- Qanash, H., Bazaid, A. S., Binsaleh, N. K., Patel, M., Althomali, O. W., & Sheeha, B. B. (2023). In Vitro Antiproliferative Apoptosis Induction and Cell Cycle Arrest Potential of Saudi Sidr Honey against Colorectal Cancer. *Nutrients*, 15(15). <https://doi.org/10.3390/nu15153448>
- Radiah, A. G., Elyna Fatinie, J., Nor Azni, M. N. A. S., & Nik Nurasyikin, N. A. M. (2015). The role of polyamines in anti-proliferative effect of Selected Malaysian Herbs in Human Lung Adenocarcinoma Cell Line. *Jurnal Teknologi*, 77(25), 2180–3722. [www.jurnalteknologi.utm.my](http://www.jurnalteknologi.utm.my)
- Rai, A. K., Khan, S., Kumar, A., Dubey, B. K., Lal, R. K., Tiwari, A., Trivedi, P. K., Elliott, C. T., & Ratnasekhar, C. (2023). Comprehensive Metabolomic Fingerprinting Combined with Chemometrics Identifies Species- and Variety-Specific Variation of Medicinal Herbs: An Ocimum Study. *Metabolites*, 13(1). <https://doi.org/10.3390/metabo13010122>
- Rayan, S. (2018). Causality and Reliance (Tawakkul) in Ghazali's Epistemological System. *Journal of Islamic Studies and Culture*, 6(1). <https://doi.org/10.15640/jisc.v6n1a6>
- Ridzuan, R. N., Fauzi, N., Amat, R. A., & Ghazali, N. Z. M. (2019). A Bibliometric Study towards the Application of Herbs in an Academic Environment. *Khazanah Al-Hikmah : Jurnal Ilmu Perpustakaan, Informasi, Dan Kearsipan*, 7(1), 23. <https://doi.org/10.24252/kah.v7i1a3>
- Sehrawat, R., Rathee, P., Akkol, E. K., Khatkar, S., Lather, A., Redhu, N., & Khatkar, A. (2022). Phenolic Acids - Versatile Natural Moiety with Numerous Biological Applications. *Current Topics in Medicinal Chemistry*, 22(18), 1472–1482. <https://doi.org/10.2174/156802662266220623114450>
- Serrano, D., Lazzeroni, M., & Bonanni, B. (2015). Cancer chemoprevention: Much has been done, but there is still

- much to do. State of the art and possible new approaches. *Molecular Oncology*, 9(5), 1008–1017. <https://doi.org/10.1016/j.molonc.2014.12.006>
- Shaban, A. M., Raslan, M., Sharawi, Z. W., Abdelhameed, M. S., Hammouda, O., El-Masry, H. M., Elsayed, K. N. M., & El-Magd, M. A. (2023). Antibacterial, Antifungal, and Anticancer Effects of Camel Milk Exosomes: An In Vitro Study. *Veterinary Sciences*, 10(2). <https://doi.org/10.3390/vetsci10020124>
- Shafiq, H., Ahmad, A., Masud, T., & Kaleem, M. (2014). Cardio-protective and anti-cancer therapeutic potential of *Nigella sativa*. *Iranian Journal of Basic Medical Sciences*, 17, 967–979.
- Shang, A., Cao, S. Y., Xu, X. Y., Gan, R. Y., Tang, G. Y., Corke, H., Mavumengwana, V., & Li, H. bin. (2019). Bioactive compounds and biological functions of garlic (*allium sativum* L.). *Foods*, 8(7). <https://doi.org/10.3390/foods8070246>
- Shankar, M. G., Swetha, M., Keerthana, C. K., Rayginia, T. P., & Anto, R. J. (2022). Cancer Chemoprevention: A Strategic Approach Using Phytochemicals. *Frontiers in Pharmacology*, 12. <https://doi.org/10.3389/fphar.2021.809308>
- Shin, S. H., Oh, S. M., Yoon Park, J. H., Lee, K. W., & Yang, H. (2022). OptNCMiner: a deep learning approach for the discovery of natural compounds modulating disease-specific multi-targets. *BMC Bioinformatics*, 23(1). <https://doi.org/10.1186/s12859-022-04752-5>
- Singh, M., Singh, P., & Shukla, Y. (2012). New strategies in cancer chemoprevention by phytochemicals. *Frontiers in Bioscience*, 426–452.
- Song, H., Liu, B., Dong, B., Xu, J., Zhou, H., Na, S., Liu, Y., Pan, Y., Chen, F., Li, L., & Wang, J. (2021). Exosome-Based Delivery of Natural Products in Cancer Therapy. In *Frontiers in Cell and Developmental Biology* (Vol. 9). <https://doi.org/10.3389/fcell.2021.650426>
- Sumarlin, L. O., Nugraha, A. T., Muawanah, A., Ernita, N., & Amilia, N. (2023). Characterization of the compound of longan honey from indonesia using LC-MS/MS and FTIR and the mechanism of inhibition of HEP-2 cells. *Journal of Research in Pharmacy*, 27(5), 2035–2057. <https://doi.org/10.29228/jrp.483>
- Sun, D., Shan, K.-S., Wang, J.-S., Chen, Y.-Z., Shang, L., Khan, Y., Ma, B.-Z., & Li, L.-P. (2016). Paclitaxel exerts anticancer bioactivity on SGC7901 human gastric adenocarcinoma cell line through inhibition of Akt/mTOR signaling pathway. *International Journal of Clinical and Experimental Pathology*, 9(2), 651–661. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-84968902331&partnerID=40&md5=7355b980822672e9a176a2d3d374d070>
- Svatek, R. S., Lee, J. J., Roehrborn, C. G., Lippman, S. M., & Lotan, Y. (2008). Cost-effectiveness of prostate cancer chemoprevention: A quality of life-years analysis. *Cancer*, 112(5), 1058–1065. <https://doi.org/10.1002/cncr.23276>
- Tang, S., Li, S., Tang, B., Wang, X., Xiao, Y., & Cheke, R. A. (2023). Hormetic

- and synergistic effects of cancer treatments revealed by modelling combinations of radio - or chemotherapy with immunotherapy. *BMC Cancer*, 23(1). <https://doi.org/10.1186/s12885-023-11542-6>
- Tao, C., Miao, X., Yan, J., Xiao, X., Wu, R., Cao, Q., Wang, Z., Lv, R., Ge, T., & Liu, J. (2023). Hypoxia-targeted and spatial-selective tumor suppression by near infrared nanoantenna sensitized engineered bacteria. *Acta Biomaterialia*, 170, 442–452. <https://doi.org/10.1016/j.actbio.2023.08.044>
- The Global Cancer Observatory: Malaysia*. (2021). <https://gco.iarc.fr/today/data/factsheets/populations/458-malaysia-factsheets.pdf>
- Transforming our World: The 2030 Agenda for Sustainable Development*. (2015).
- Tuama, A. A., & Mohammed, A. A. (2019). Phytochemical screening and in vitro antibacterial and anticancer activities of the aqueous extract of *Cucumis sativus*. *Saudi Journal of Biological Sciences*, 26(3), 600–604. <https://doi.org/10.1016/j.sjbs.2018.07.012>
- Tuli, H. S., Yerer, M. B., & Sak, K. (2022). Editorial: Current Aspects in Chemopreventive Strategies, Volume II. *Frontiers in Pharmacology*, 13. <https://doi.org/10.3389/fphar.2022.961334>
- Uthpala, T. G. G., Wettimuny, D., Marapana, R. A. U. J., Lakmini, K. P. C., & Wettimuny, D. C. (2020). Nutritional Bioactive Compounds and Health Benefits of Fresh and Processed Cucumber (*Cucumis Sativus* L.). *Sumerianz Journal of Biotechnology*, 3(9), 75–82. <https://doi.org/10.13140/RG.2.2.17510.04161>
- Wang, L.-L., Yang, H.-W., Zhu, F.-D., Chi, S.-M., Zhang, J., Yang, J.-M., & Zhao, Y. (2022). Host-guest inclusion systems of two bioactive natural products derivatives and three polyamine-modified  $\beta$ -cyclodextrins: Preparation, characterization, biological activity. *Journal of Drug Delivery Science and Technology*, 67. <https://doi.org/10.1016/j.jddst.2021.102940>
- Wani, B. A., Wani, F. M., Khan, A., Bodha, R., Mohiddin, F., & Hamid, A. (2011). Some Herbs Mentioned in the Holy Qur'an and Ahadith and their Medicinal Importance in Contemporary Times. *Journal of Pharmacy Research*, 4(11), 3888–3891. [www.jpronline.info](http://www.jpronline.info)
- WHO report on cancer: setting priorities, investing wisely and providing care for all*. (2020). <http://apps.who.int/bookorders>.
- Yang, Z., Liang, Q., Liang, H., Chen, W., Li, C., Xiao, Y., Liang, Y., Wang, M., Tan, X., Wu, X., Lin, Y., Chen, X., Huang, Q., Wen, Z., & Huang, R. (2023). Single-cell RNA transcriptomic and plasma Lipidomic reveal the potential mechanisms of a Methotrexate-based therapy against Rheumatoid Arthritis. *Phytomedicine*, 115. <https://doi.org/10.1016/j.phymed.2023.154816>
- Zaer, M., Moeinzadeh, A., Abolhassani, H., Rostami, N., Tavakkoli Yarak, M., Seyedi, S. A., Nabipoorashrafi, S. A., Bashiri, Z., Moeinabadi-Bidgoli, K., Moradbeygi, F., Farmani, A. R., &

- Hossein-Khannazer, N. (2023). Doxorubicin-loaded Niosomes functionalized with gelatine and alginate as pH-responsive drug delivery system: A 3D printing approach. *International Journal of Biological Macromolecules*, 253. <https://doi.org/10.1016/j.ijbiomac.2023.126808>
- Zaid, H., Rayan, A., Said, O., & Saad, B. (2010). Cancer Treatment by Greco-Arab and Islamic Herbal Medicine. *The Open Nutraceuticals Journal*, 3, 203–212.
- Zarshenas, M. M., & Bardbori, A. M. (2017). A medieval description of metastatic breast cancer; from Avicenna's view point. *The Breast*, 31, 20–21. <https://doi.org/10.1016/j.breast.2016.10.019>
- Zawrzykraj, M., Deptuła, M., Kondej, K., Tymińska, A., & Pikuła, M. (2023). The effect of chemotherapy and radiotherapy on stem cells and wound healing. Current perspectives and challenges for cell-based therapies. *Biomedicine and Pharmacotherapy*, 168. <https://doi.org/10.1016/j.biopha.2023.115781>

### ***Article History***

*Received: 31/08/2023*

*Accepted: 07/11/2023*