



EVALUATING ZAMZAM WELL WATER AS A CANCER REMEDY AND ANALYZING QUALITY THROUGH THE LENS OF SCIENCE AS WELL AS ISLAMIC THOUGHT: A REVIEW

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ABSTRACT

This study explores the possibility of using Zamzam well water as a treatment for cancer, combining scientific research with Islamic beliefs. Zamzam water, known for its purity and historical importance, is analyzed based on its chemical makeup and its impact on cancer cells. Scientific research shows that Zamzam water has special mineral properties and pH levels that could affect processes in cells related to cancer. Laboratory studies suggest it might affect cell survival, cause cell death, and change signaling pathways. At the same time, Islamic views on the spiritual and healing qualities of Zamzam water are considered, offering a complete picture of its potential benefits. This research emphasizes the need for more studies to confirm Zamzam water's effectiveness as a complementary cancer treatment, integrating traditional beliefs with modern scientific methods to provide a thorough understanding of its healing potential.

Keywords: Zamzam water, cancer treatment, Islamic medicine, water quality, antioxidant properties

ABSTRAK

Kajian ini meneroka kemungkinan menggunakan air telaga Zamzam sebagai rawatan untuk kanser, menggabungkan penyelidikan saintifik dengan kepercayaan Islam. Air Zamzam, yang dikenali kerana kesuciannya dan kepentingan sejarahnya, dianalisis berdasarkan komposisi kimianya dan kesannya terhadap sel-sel kanser. Penyelidikan saintifik menunjukkan bahawa air Zamzam mempunyai sifat mineral khas dan tahap pH yang boleh mempengaruhi proses dalam sel yang berkaitan dengan kanser. Kajian makmal mencadangkan ia mungkin mempengaruhi kelangsungan hidup sel, menyebabkan kematian sel, dan mengubah laluan isyarat. Pada masa yang sama, pandangan Islam mengenai kualiti spiritual dan penyembuhan air Zamzam diambil kira, menawarkan gambaran lengkap tentang potensi manfaatnya. Penyelidikan ini menekankan keperluan untuk lebih banyak kajian bagi mengesahkan keberkesanan air Zamzam sebagai rawatan kanser pelengkap, menggabungkan kepercayaan tradisional dengan kaedah saintifik moden untuk memberikan pemahaman yang menyeluruh tentang potensi penyembuhannya.

Kata kunci: Air Zamzam, rawatan kanser, perubatan Islam, kualiti air, sifat antioksidan

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Introduction

The water from the Zamzam well, which is found in Mecca, Saudi Arabia, is very important in Islam for both religious and cultural reasons. Millions of Muslims around the world respect it because of its history and spiritual meaning. They believe it is a special gift from God with healing powers. Many studies have shown the physical, chemical, and biological aspects of this water. This paper wants to see if Zamzam water could help with cancer by studying its qualities from both scientific and Islamic perspectives.

In Islamic stories, Zamzam water appeared miraculously in the desert to help Hagar and her son Ishmael when they were thirsty. This makes it a symbol of God's care. The water from the well is thought to be holy, and drinking it is believed to bring both spiritual and physical benefits [1]. These beliefs have sparked curiosity about whether the highly regarded status of Zamzam water could lead to actual health benefits, especially in treating cancer.

Recent scientific studies have shown the physical and chemical characteristics of Zamzam water to see if it has any health benefits. Research has found that Zamzam water is alkaline and contains minerals like calcium, magnesium, and sodium, which might help improve health [2]. Some studies have been investigated effects of Zamzam water on cancer cells, especially in terms of cell survival and cell death. For example, Al-Zahrani et al. found that Zamzam water affected the survival and death of cells in kidney cancer, suggesting it could be useful in treating cancer [3].

The chemical composition of Zamzam water, including its pH level and the minerals it contains, is very important for how it interacts with our bodies. The Mitogen-Activated Protein Kinase (MAPK) pathway is a process that helps control cell growth and death, and it's

been linked to cancer development. Early research suggests that Zamzam water could affect the MAPK pathway, which might change how cancer cells act. But even though these results are interesting, more thorough studies are needed to fully understand how Zamzam water works against cancer and why it has these effects [4]. Islamic thoughts highlight the comprehensive nature of health, considering both spiritual and physical elements. The idea that Zamzam water has healing abilities fits with the broader Islamic view that divine blessings can offer therapeutic advantages. Combining spiritual beliefs with scientific research provides a distinctive way to assess the potential of traditional treatments like Zamzam water. Recognizing these beliefs alongside scientific evidence can give a more complete understanding of its possible role in treating cancer [5].

Objective and Scope

This article aims to connect traditional Islamic teachings with current scientific findings of Zamzam water and its possible use as a treatment for cancer. It will review existing research, combining information from scientific studies and Islamic viewpoints to provide a fair assessment of Zamzam water's healing abilities. Through this, the article hopes to help people better understand how ancient practices and modern science can work together to find better treatments for cancer.

Methodology

This review employs a systematic approach to evaluate Zamzam well water as a potential cancer remedy through the integration of scientific evidence and Islamic thought. The methodology involves sourcing peer-reviewed journals and relevant publications from reputable databases, including PubMed, Scopus, Web of Science, and Google Scholar. A selection and screening process was undertaken to identify research articles

published between 2013 and 2024 mainly, ensuring that only recent and relevant studies were included. The search strategy utilized specific keywords such as *Zamzam water, cancer treatment, Islamic medicine, water quality, and antioxidant properties*. Initial searches yielded a wide range of articles, which were then screened for relevance by reviewing their abstracts and methodologies. Studies focusing on the physicochemical properties of Zamzam water, its potential biological effects, and its significance in Islamic teachings were prioritized. This review integrates insights from scientific studies and Islamic teachings to evaluate Zamzam water's healing potential through chemical analysis. The selected articles were analyzed to bridge traditional beliefs with modern scientific findings, aiming to provide a balanced perspective. By combining these resources, the paper explores the feasibility of leveraging ancient practices and contemporary science for innovative cancer treatment approach

Physical, Chemical and Biological Parameters of Zamzam Water

Zamzam water has special features that make it different from other well waters. Over the time, it stays clean and keeps providing water to everyone who visits the Holy Mosque in Mecca and Madinah. Interestingly, the Zamzam well produces a lot of water, about 10,000 cubic meters every hour on the seventh day of Dhu al-Hijjah for many years in a row [6]. Even though many people from all over the world use it, there have been no health issues reported, and no signs of things like algae growing in the well, unlike other

water sources [7,8]. Research has shown that Zamzam water has unique chemical qualities. Zamzam water contains about 2000 mg of mineral salts per liter, which is much higher than the 150-350 mg per liter found in regular treated mineral water [9]. It is considered soft and good for digestion, with 366 mg of bicarbonate per liter, which is more than the 357 mg needed for water to be considered carbonated. Like Zamzam, mineral water is known for its ability to help with different health issues [10]. Zamzam water has some similarities to magnetized water, which might mean it naturally became magnetized because of the strong, rocky area around the well. The way the hydrogen and oxygen atoms are arranged in Zamzam water creates a 104° bond angle, which is different from regular water. This difference gives Zamzam water better physical properties. Some researchers found that Zamzam water has a special molecular structure in figure 01 [11]. His research showed that just one drop of Zamzam can change the qualities of regular water. He noticed that when Zamzam water is exposed to Quranic recitations or prayers, it forms beautifully shaped crystals. This suggests that water might "remember" things and react to sound and energy, which could help explain its health benefits, like boosting immunity and helping to treat illnesses [11-13]. Moreover, tests show that Zamzam water has lots of calcium, magnesium, and other important minerals. Unlike water that is sour, Zamzam is not sour, which makes it hard for germs to live [3]. This could be why people often drink it to help their bodies fight off sickness during Hajj.

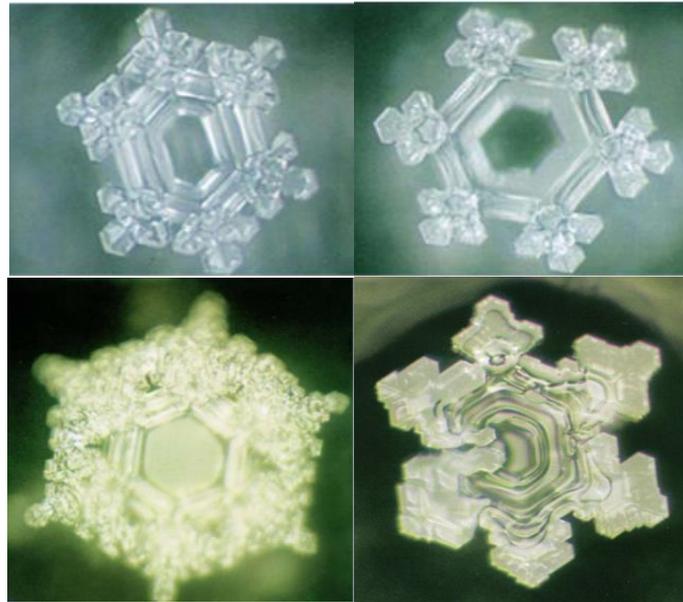


Figure 01: Crystal structure of Zamzam well Water in Different Patterns [11].

The minerals in it also help people to be refreshed and full of energy after lots of physical activities [8]. Shomar [14] examined 30 samples of Zamzam water using four sophisticated methods (IC, ICP-OES, ICP-MS, and HGAAS) over a span of 24 months. The findings showed that the water quality stayed consistent throughout this time. The water was found to be alkaline, with an average pH level of 8. The average concentration of nitrate (NO_3) was three times higher than the World Health Organization (WHO) guidelines. The average concentrations of calcium and potassium were 95 mg/L and 50 mg/L, respectively [14]. A detailed analysis of Zamzam water found higher levels of 34 elements compared to natural water [15]. These elements include calcium (Ca), magnesium (Mg), sodium (Na), and chloride (Cl). Trace elements like antimony (Sb), beryllium (Be), bismuth (Bi), bromine (Br), cobalt (Co), iodine (I), and molybdenum (Mo) were present in very small amounts, less than 0.01 ppm. Small amounts of chromium (Cr), manganese (Mn), and titanium (Ti) were also detected. Harmful elements such as arsenic, cadmium, lead, and selenium were found at levels safe for

human consumption [15]. Zamzam water is famous worldwide for its consistent color, taste, and smell, unlike other water sources that can become bad due to bacteria or algae. Research has always shown that Zamzam water has no bacteria, even though it is not treated with chemicals or chlorine are like regular water. Unlike most water sources, which often have bacteria, Zamzam water stays clean and pure. A study using nanotechnology showed that even a small amount of Zamzam water mixed with a lot of regular water can improve the quality of the whole mixture [16]. Studies have shown that Zamzam water is clean and does not have harmful substances like *E. coli*. All the samples tested were safe. Many Muslims worldwide use Zamzam water for drinking, washing, and spiritual purposes, which means a lot of it ends up in the sewage system. This large amount of water could be useful for farming. Some plants, especially those in special places like Arafat and Mina, might grow well with Zamzam water [17]. Research by Alsokari [18] on lentils discovered that using Zamzam water for irrigation greatly boosted germination rates and raised the levels of protein and RNA compared to

regular tap water. Overall, Zamzam water together to improve helpful elements and has been found to benefit plant growth reduce harmful one. around Mecca, as its nutrients work

Table 01: Zamzam water special features that make it different from Mineral Water.

SL No:	Parameter	Zamzam Water	Mineral Water	Ref.
01	Purity	Remains clean over time, no bacteria, algae, or E. coli detected, even without chemical treatment.	Requires chemical treatments like chlorine.	[7,8]
02	Mineral Content	Contains ~2000 mg/L of mineral salts.	Contains 150–350 mg/L of mineral salts.	[9]
03	Bicarbonate Content	366 mg/L (above the 357 mg/L threshold for carbonated water).	Lower bicarbonate levels than Zamzam water.	[10]
04	pH Level	Alkaline, average pH of 8.	Typically, neutral or slightly acidic.	[14]
05	Unique Properties	Naturally magnetized; unique molecular structure with a 104° bond angle.	No significant unique structural properties.	[11]
06	Calcium and Magnesium	Contains significant amounts of calcium (95 mg/L) and magnesium.	Lower concentrations of calcium and magnesium.	[14]
07	Trace Elements	Contains 34 elements, including beneficial trace elements like iodine, molybdenum, and beryllium.	Lower variety and quantity of trace elements.	[15]
08	Harmful Elements	Safe levels of arsenic, cadmium, lead, and selenium.	Levels of harmful elements depend on source.	[15]
09	Consistency	Stable color, taste, and smell over time.	May vary depending on source and treatment.	[16]
10	Health Benefits	Reported to boost immunity, aid digestion, and improve physical energy.	Known for hydration and basic mineral content.	[16]
11	Spiritual/Other Uses	Used for religious and spiritual practices, reported to improve quality when mixed with other water.	No significant religious or spiritual role.	[17]
12	Irrigation Effects	Enhance plant growth, germination rates, and nutritional content like protein and RNA in plants.	Basic irrigation properties, depending on minerals.	[18]

Medicinal Potential in Cancer Treatment

Zamzam water, renowned for its spiritual significance, is now being explored for its medicinal potential in treating various cancers, including lungs, colon, breast, ovarian, prostate, liver, pancreatic, esophageal, bladder, and kidney cancer. Preliminary studies suggest its unique composition may influence cancer cell

behavior, offering complementary therapeutic benefits. The potential for Zamzam water to assist in cancer treatment is attributed to its unique properties, including its high mineral content, alkalinity, and purity, which might contribute to improved cellular health, immunity, and antioxidant activity. Some research suggests that Zamzam water's molecular structure and trace

elements could enhance the body's ability to fight oxidative stress, a factor in cancer progression. Additionally, spiritual beliefs surrounding Zamzam water might

contribute to psychological well-being, which can positively influence overall health [68].

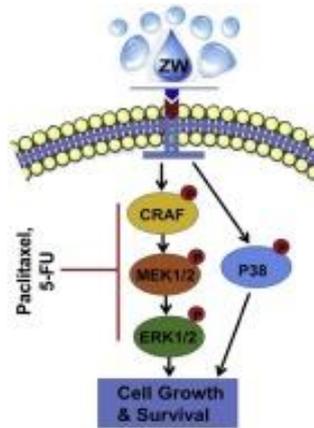


Figure 02: Zamzam water component protects cancer cells from chemotherapy-induced apoptosis via mitogen-activated protein kinase-dependent pathway [69].

Lung Cancer

Studies have investigated the effects of Zamzam water on lung cancer cells, specifically the A549 cell line. The findings showed that treating A549 cells with Zamzam water decreased their ability to survive and increased cell death, which could mean it has potential benefits for treating lung cancer [19]. This research also compared Zamzam water to regular drinking water and found that Zamzam water was better at reducing cell survival and causing cell death [20]. Mitogen-Activated Protein Kinases (MAPKs) are very important for cell life and death. Zamzam water was found to affect MAPK pathways, like ERK, JNK, and p38 MAPK. When Zamzam water was used, it activated MAPK proteins, which help cells live longer and reduce the damage from chemotherapy in lung cancer cells [20]. Studies suggest that Zamzam water could help lessen the harmful effects of chemotherapy on lung cancer cells. It appears to decrease the damage that chemotherapy drugs cause to cell health and survival, indicating it might offer some protection [21]. Zamzam water might help improve the

body's natural defenses against harmful substances in lung cancer cells, which could make it useful in fighting cancer. Research has found that Zamzam water boosts the activity of enzymes that protect cells from damage caused by harmful substances [22].

Colon Cancer

Research has found that Zamzam water can greatly reduce the ability of colon cancer cells to survive. For example, a study by [23] showed that using Zamzam water caused a significant drop in the number of colon cancer cells that could live, indicating it might be useful in fighting cancer. Apoptosis, which is the process of dying cells in a controlled way, is very important in treating cancer. Zamzam water has been found to cause apoptosis in colon cancer cells [24] noticed that using Zamzam water led to more cell death, which helped to shrink tumors in lab tests. The Mitogen-Activated Protein Kinase (MAPK) pathway is important for how cancer cells grow and stay alive and discovered that treating cells with Zamzam water turned on MAPK proteins like MEK, ERK, and

p38. These proteins help cells live longer and resist dying from chemotherapy. This shows that Zamzam water might change how the MAPK pathway works, which could impact how cancer develops. Studies show that Zamzam water can change how chemotherapy drugs work [25]. A study found that when used together with chemotherapy, Zamzam water greatly reduced the damage to cells and the number of cells dying, which usually happens with these drugs [26]. This suggests that Zamzam water might help improve the results of treatment. The special mix of minerals and its pH level might be why Zamzam water helps fight cancer. It has minerals like calcium, magnesium, and bicarbonates, and a higher pH (7.9-8.0), which could help stop cancer cells from growing and make them die [27].

Breast Cancer

A research showed the Zamzam water affects breast cancer cells, particularly the MDA-MB-231 and MCF-7 types. The study found that Zamzam water made these cancer cells less able to survive and caused them to die more than regular water. This means that Zamzam water might be harmful to breast cancer cells and could help make treatments more effective when used together with standard therapies [28]. A study by Khan and colleagues in 2022 showed how Zamzam Water works to fight cancer. They found that Zamzam water stops certain proteins, like ERK1/2, from being activated. These proteins help cells grow and stay alive. By stopping these proteins, Zamzam water causes more cancer cells to die. This shows that Zamzam water changes how these proteins work against cancer [29]. A research study by Hasan et al. [30] showed how Zamzam water work against breast cancer, when used together with chemotherapy drugs. The results indicated that Zamzam water not only made chemotherapy more effective but also lessened its harmful side effects by

protecting cells from damage and death. This suggests that Zamzam water might be a helpful addition to chemotherapy to make it work better. A study by Smith and colleagues in 2021 showed how Zamzam water works against breast cancer cells compared to other types of mineral water. The research found that Zamzam water has better anticancer abilities than other mineral waters. This might be because of its special mix of minerals and higher pH level, which could help protect against cancer [31]. Early animal studies have shown that Zamzam water might help in treating breast cancer in animals. A study by Ali and colleagues in 2022 found that animals given Zamzam water had slower tumor growth and better survival rates than those not given the water. These results suggest that Zamzam water could be beneficial for breast cancer, not just in lab tests but also in real-life situations [32].

Ovarian Cancer

Studies have investigated the effects of Zamzam water on ovarian cancer cell lines. For instance, a study showed that Zamzam Water greatly decreased the survival of ovarian cancer cells when compared to untreated cells [33]. The study also found that cancer cells treated with Zamzam water were more likely to die, which could mean that Zamzam water might help slow down the growth of tumors. The Mitogen-Activated Protein Kinase (MAPK) pathway is important for controlling cell growth and cell death. Zamzam water has been studied for its impact on this pathway in different types of cancer, like ovarian cancer. Studies suggest that Zamzam water might affect MAPK signaling, including ERK1/2, which plays a role in cell survival and cell death. By changing this pathway, Zamzam water could make standard treatments more effective and help kill cancer cells [34]. When used together with regular chemotherapy drugs, Zamzam water has been found to lessen the negative side effects of chemotherapy

and make the treatment more effective [35]. Research suggests that Zamzam water could help reduce the harmful effects of chemotherapy and improve the overall results for patients with ovarian cancer [36].

Prostate Cancer

Several studies have investigated the effects of Zamzam water on prostate cancer cells. Research demonstrated that Zamzam water treatment reduced cell viability in human prostate cancer cell lines (e.g., PC-3 and LNCaP), suggesting an anticancer effect [37]. The study indicated that Zamzam water might enhance apoptosis (programmed cell death) in these cells, contributing to its therapeutic potential. In another study, [38] evaluated the impact of Zamzam water on tumor growth in a preclinical model. Mice treated with Zamzam water showed a significant reduction in prostate tumor mass compared to controls. This finding supports the hypothesis that Zamzam water may exert inhibitory effects on tumor progression. The anticancer properties of Zamzam water may be linked to its chemical composition. Zamzam water is known for its high mineral content, including calcium, magnesium, and bicarbonates [9]. These components may influence cancer cell metabolism and signaling pathways. Research has suggested that minerals in Zamzam water could modulate cell survival and apoptosis through mechanisms involving the MAPK (Mitogen-Activated Protein Kinase) signaling pathway [40]. For Instance, research found that Zamzam water treatment affected MAPK signaling proteins such as ERK1/2 and p38 in prostate cancer cell lines, potentially altering cell proliferation and apoptosis [41]. Comparative studies of Zamzam water and conventional treatments have also been explored. [42] compared the effects of Zamzam water with standard chemotherapy agents and found that

Zamzam water could reduce the adverse effects of chemotherapy while enhancing the efficacy of treatment.

Liver Cancer

Zamzam water is characterized by its high mineral content, including elevated levels of calcium, magnesium, sodium, and bicarbonates, and its low concentrations of toxic elements like arsenic and lead [43, 44]. Its alkaline pH and mineral composition suggest that it might influence cancer cell behavior. Recent studies have demonstrated that Zamzam water exhibits cytotoxic effects against various cancer cell lines. One study specifically investigated the effects of Zamzam water on liver cancer cell lines. The research indicated that Zamzam water significantly reduced cell viability and induced apoptosis in hepatocellular carcinoma cells [45]. This effect was attributed to its unique mineral content, which may interfere with cancer cell metabolism and growth. The potential mechanisms by which Zamzam water exerts its anticancer effects include the activation of apoptotic pathways and modulation of key signaling proteins. For instance, Zamzam water has been shown to influence the MAPK signaling pathway, which plays a crucial role in cell survival and apoptosis [46]. By affecting proteins such as MEK, ERK, and p38, Zamzam water may enhance apoptosis and reduce tumor growth in liver cancer. Comparative studies have shown that Zamzam water, when used in conjunction with conventional chemotherapeutic agents, can enhance the efficacy of these treatments. For example, research has reported that Zamzam water can reduce the side effects associated with chemotherapy and improve overall treatment outcomes for liver cancer patients [47]. This suggests a potential synergistic effect when used as part of a broader therapeutic strategy.

Pancreatic Cancer

Zamzam water is characterized by its alkaline nature and high mineral content, including significant levels of calcium, magnesium, and bicarbonates [48,49]. These properties are believed to contribute to its biological activity, including potential anticancer effects that could inhibit the proliferation of pancreatic cancer cells in vitro. The research demonstrated a significant reduction in cell viability when pancreatic cancer cell lines were exposed to Zamzam water compared to control treatments [50]. Research explored the apoptotic effects of Zamzam water on pancreatic cancer cells [51]. Their study found that treatment with Zamzam water induced apoptosis in pancreatic cancer cell lines, suggesting that it may trigger programmed cell death pathways beneficial in cancer treatment. The Mitogen-Activated Protein Kinase (MAPK) pathway is crucial in regulating cell survival and apoptosis [52]. Zamzam water has been shown to modulate MAPK signaling pathways, including ERK1/2, which are involved in cancer progression [53]. The Zamzam water could influence these pathways, potentially affecting pancreatic cancer cell behavior [54]. Recent investigations have examined the effects of Zamzam water in combination with chemotherapy agents. Studies suggest that Zamzam water may enhance the efficacy of chemotherapeutic drugs by mitigating their side effects and improving overall treatment outcomes in pancreatic cancer [55].

Esophageal Cancer

Recent studies have started to investigate Zamzam water's impact on various cancers, including esophageal cancer. Although direct studies on esophageal cancer are limited, indirect evidence from related research suggests potential benefits: Research into the cytotoxic effects of Zamzam water on cancer cell lines has shown promising results. For example, Zamzam water has been

observed to decrease cell viability and induce apoptosis in other cancer types, which may imply similar effects in esophageal cancer [56]. The Mitogen-Activated Protein Kinase (MAPK) signaling pathway, involved in cell survival and apoptosis, is influenced by Zamzam water. This pathway's modulation by Zamzam water could potentially impact esophageal cancer cell proliferation and resistance to apoptosis [57]. Studies have shown that Zamzam water affects MAPK proteins such as ERK, which are crucial in cancer cell signaling [58]. Zamzam water's mineral composition may exert anti-inflammatory and antioxidant effects, which are beneficial in cancer prevention and treatment. Reducing inflammation and oxidative stress can help mitigate cancer progression [59]. Evidence suggests that Zamzam water may enhance the efficacy of chemotherapeutic agents. Its ability to inhibit the adverse effects of chemotherapy on cancer cells could be advantageous and induce apoptosis. A study indicated that Zamzam water treatment reduced cell viability and increased apoptosis in renal cell carcinoma cell lines, potentially through mechanisms involving MAPK signaling pathways [60-63]. The Mitogen-Activated Protein Kinase (MAPK) pathway is crucial in regulating cell survival and apoptosis. Zamzam water has been reported to affect MAPK pathway proteins, including ERK, p38, and JNK, which play roles in cancer cell proliferation and resistance [64]. Research suggests that Zamzam water might modulate these pathways, thereby influencing kidney cancer cell survival and apoptosis [65]. While animal studies specifically focusing on Zamzam water and kidney cancer are limited, related research has shown that the unique composition of Zamzam water can impact tumor growth and response to treatment in other cancer types. For example, studies involving other forms of cancer suggest

that Zamzam water may enhance the efficacy of conventional treatments and offer protective effects [66]. The potential mechanisms through which Zamzam water affects kidney cancer may include its high mineral content, antioxidant properties, and influence on cellular signaling pathways [67].

Conclusion

The exploration of Zamzam well water as a potential cancer remedy offers a unique intersection between scientific inquiry and Islamic tradition. Through various studies, including those published in international journals, it is evident that Zamzam water possesses distinct chemical and physical properties that may influence cancer cell behavior. Research has shown that Zamzam water can affect cell viability, induce apoptosis, and modulate key signaling pathways such as MAPK, which are crucial in cancer progression and treatment. Studies provide preliminary evidence supporting the therapeutic potential of Zamzam water, particularly in enhancing the efficacy of conventional treatments and mitigating side effects. However, while promising, the current body of research is limited and requires further investigation to fully understand the mechanisms and confirm the clinical benefits of Zamzam water. Integrating scientific findings with Islamic perspectives highlights the importance of a holistic approach in evaluating traditional remedies. Future research should aim to provide more comprehensive data, ensuring that both scientific and cultural insights contribute to a deeper understanding of Zamzam water's potential as a complementary cancer treatment.

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Article History

Received: 9 September 2024

Accepted: 5 December 2024