

Observational study and literature review of the use of camel urine for treatment of cancer patients

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Abstract

Background: Complementary and alternative medicine is widely used in Saudi Arabia. One of the commonly used methods is camel urine alone or mixed with camel milk, which is supported by vague religious beliefs.

Aims: To observe and follow up our cancer patients who insisted upon using camel urine, and to devise some clinically relevant recommendations.

Methods: We observed 20 cancer patients (15 male, 5 female) from September 2020 to January 2022 who insisted upon using camel urine. We documented the demographics of each patient, the method of administering camel urine, the reasons for refusing conventional treatment, the period of follow-up, and the outcome and side effects.

Results: All the patients had radiological investigations before and after finishing treatment with camel urine. All patients used a combination of camel urine and milk, and treatment ranged from a few days up to 6 months. The average amount of urine/milk consumed was 60 ml/day. No clinical benefit was observed and 2 patients developed brucellosis. Eleven patients changed their mind and accepted conventional antineoplastic treatment but 7 were too weak to receive further treatment and died from their disease.

Conclusion: Camel urine had no clinical benefits in cancer patients, and may even have caused zoonotic infection. The promotion of camel urine as a traditional medicine should be stopped because there is no scientific evidence to support it.

Keywords: camel urine, camel milk, cancer, religious treatment, complementary and alternative medicine

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Introduction

Complementary and alternative medicine is widely used in Saudi Arabia as part of traditional health care and practice, and it is preferred by some cancer patients because they think it is safe and natural compared with chemotherapy and radiotherapy (1). One of the commonly used forms of complementary and alternative medicine is camel urine alone or in combination with camel milk. This practice is supported by a story from Islamic tradition (2, 3).

We have noticed through our daily practice that many of our patients use this type of therapy on the recommendation of others and sometimes without informing their treating

physicians. Healthcare providers do not recommend this treatment, especially for those who are still in active conventional treatment, but many of our patients still insist on trying it. Some preclinical data have shown some anticancer properties of camel urine but it has not been investigated clinically (5–7). Other cultures use urine from cows or other animals, and some even use human urine (16, 20).

An outbreak of MERS-CoV occurred in Saudi Arabia in 2012 and camels were suspected as a possible original source of the virus. This led the World Health Organization (WHO) to recommend that any consumption of raw or undercooked animal products, including milk, urine, and meat, should be avoided (13, 14).

In this study, we observed and followed up our cancer patients who insisted upon using camel urine to establish exactly how they administered the urine and whether there were any clinical benefits or harm. This is possibly the first clinical report on the effect and side effects of camel urine in human cancer patients who insisted upon using camel urine instead of established antineoplastic agents.

Methods

We estimated that a sample size of 66 patients would be needed, based on the local prevalence of camel milk/urine consumption of ~24%. The sample size was calculated using the statistical formula $n = Z^2 P(1-P)/d^2$, where Z was the statistic corresponding to level of confidence, P was the expected prevalence, and d was the precision. We included patients who were supposed to start chemotherapy between September 2020 and January 2022 but refused to receive it. Instead, the patients insisted upon using camel urine, despite receiving counselling that this type of treatment is unproven and any delay in their treatment might be harmful. The patients gave signed informed consent and baseline computed tomography and laboratory investigations were conducted. All patients were made fully aware that they could

change their mind any time and return to their antineoplastic treatment. The study was approved by the local ethical committee of King Fahad Medical City (21-339).

All patients in the study used camel urine mixed with milk and nothing else, because the usual advice is not to mix it with other medication. We only observed the first 20 patients because we noticed that they all had disease progression and it would have been unethical to wait until we recruited the required 66 patients. We documented the demographics of each patient, urine use, reasons for refusing conventional treatment, duration of follow-up, treatment outcome, and side effects. The follow-up included history, physical examination, laboratory investigations, tumour markers, and radiological investigations. All patients underwent a radiological or biochemical investigation or both before and after stopping consumption of camel urine. We decided to report the first 20 patients because the results might contribute to changing the current beliefs about consuming camel urine for cancer treatment.

Results

We interviewed 20 patients (15 male, 5 female) with different types of cancers at different stages. All patients underwent radiological investigations, mainly computed tomography, before and after finishing consumption of camel urine. Magnetic resonance imaging was also used for patients with brain tumours, rectal cancer, and soft tissue and bone sarcoma. We measured carcinoembryonic antigen for colon and oesophageal cancer, α -fetoprotein for hepatocellular carcinoma, and carbohydrate antigen 19-9 for hepatobiliary cancer. All patients used a mixture of camel urine and milk (Table 1). The duration of consumption ranged from 3 days to 6 months, and the average amount was ~60 ml/day (volumes were estimated because most patients did not use a measured container).

Twelve patients developed metastases and the others had locally advanced or recurrent cancer. None of the patients who continued to use camel urine showed any clinical benefit. There was no improvement in tumour-related symptoms, and patients showed radiological progression and an increase in tumour markers. Two patients developed brucellosis: 1 was successfully treated with antibiotics and returned to chemotherapy; and the other developed severe respiratory failure with lung infiltration with no obvious cause. No autopsy was done on the latter patient because this is not a routine procedure in our health system (except after a court request); however, the clinical features were similar to those of MERS-CoV pneumonia. The rest of the patients had disease progression. Eleven patients changed their mind and accepted conventional antineoplastic treatment but 7 were too weak to receive any further treatment and died and 2 are still being followed up (Table 1).

All of the patients believed that camel urine was a religious treatment and the advice came mainly from the surrounding community. One patient had followed specific instructions published on Twitter promoting a schedule for the use of camel urine for cancer treatment (Faten Khorshid, The quantities that a person can consume of camel milk and urine and the method of changing the taste. Twitter post, 14 January 2022; https://twitter.com/FatenProf/status/1536550514850152449?t=aC9oTmwwvt7_PPblEUKh9Q&s=08).

Discussion and literature review

The main support for the use of camel urine mixed with camel milk came from a story from Islamic tradition. Some people from the Orayna tribe that used to live in the central part of the Arabian Peninsula came to The Prophet in Medina pretending to be Muslims. They could not tolerate city life and became unwell and had abdominal distention. The Prophet asked them to go outside the city to a herd of camels, and told them to drink their milk and urine as

a medicine because it was a common practice for those living in the desert. After doing so, they became healthy. (2, 3). There is a disagreement among Islamic scholars about whether camel urine is unclean. The Maliki and Hanbali schools of jurisprudence hold that the urine of animals whose meat can be consumed is considered to be clean (4). In contrast, the Shafii and Hanafi schools consider camel urine to be unclean. The Prophet's recommendation to use camel urine was only in an emergency, for a specific illness, and because no clean medicine was available (4).

There were some preclinical studies that claimed that camel urine had several therapeutic benefits, such as antimicrobial, anti-inflammatory, and anticancer activities, and even some beneficial cardiovascular effects. One study showed that camel urine inhibited growth of hepatocellular carcinoma (HEPG2), colon carcinoma (HCT 116), human glioma (U251), lung cancer, and leukaemia cells (5). Further studies showed that camel urine blocked cytochrome P450 1a1, a cancer-causing gene, and inhibited inflammatory angiogenesis, which can supply nutrition to tumours (6, 7). Successful anticancer agents kill cancer cells or prevent their proliferation without negatively affecting normal cell growth or disrupting the immune system (8). These features were claimed to have been seen in another study of camel urine (9). A variety of tests conducted *in vivo* and *in vitro* demonstrated the ability of camel urine to reduce or prevent the metastatic potential of breast cancer cells (10). The possible mechanism of action of camel urine was through apoptosis and suppression of cancer cells (10). The possible anticancer properties of camel urine have been vaguely demonstrated using gas chromatography/mass spectrometry and inductively coupled plasma mass spectrometry (11). That study showed higher concentrations of metabolites such as canavanine in camel urine than in other mammals' urine. Canavanine is a byproduct of amino acid and urea metabolism, and according to that study, it was potent in combating tumour cells. Camel urine has a low amount of urea and ammonia that may decrease its unpleasant

odour and toxicity when consumed by humans; however, there is a large amount of creatine and creatinine, which are toxic to humans (12). The mineral content of camel urine is 10-fold greater than that of human urine, and it is usually alkaline with pH > 7.8, while human urine is usually acidic (12).

MERS was first discovered in 2012 in Saudi Arabia and Jordan, and camels were identified as the reservoir host. This disease spreads through close contact, directly or indirectly, with camels and can also spread among infected humans (13). The causative agent MERS-CoV is a zoonotic virus that spreads from animals to humans. The disease was found to be harmless to camels but infection in humans can be severe, with 35% of all human cases resulting in death. To date, 27 countries have been affected by MERS. The method of transmission of MERS-CoV from animals to humans remains unknown. Therefore, WHO recommends that any activities related to camels must be avoided, such as close contact with dromedary camels, drinking raw camel milk or urine, or eating meat that has not been properly cooked (14).

None of the basic scientific studies about the use of camel urine in cancer patients present sufficient evidence for its use in modern medicine. Most studies are still in their early stages, using *in vivo* and *in vitro* studies on animal cells, and do not involve actual patients. There are major concerns about the correlation between preclinical and clinical data. They are not always strongly correlated and the activity of some anticancer agents in preclinical studies has not been translated into clinical benefit (26). An analysis was carried out by the National Cancer Institute Developmental Therapeutics Program on the activity of 39 compounds tested preclinically *in vivo* and *in vitro* assays, and comparing the results with corresponding data from Phase 2 clinical trials (15). The results indicated the weak correlation of preclinical models with clinical results and confirmed the need for clinical trials before approving any therapeutic methods.

Urine from other species is used worldwide. In some areas, consumption of human urine is practiced and it became popular after publication in the early 20th century of *Water of life* by the British naturopath John W. Armstrong (16). Human urine mainly consists of water (> 95%). The remaining constituents are urea 9.3 g/l, chloride 1.87 g/l, sodium 1.17 g/l, potassium 0.750 g/l, creatinine 0.670 g/l, and other dissolved ions and inorganic and organic compounds (17). Although it is widely used, there is no scientific evidence for therapeutic use in humans and harmful effects have been reported (18). Urine from goats, sheep, elephants, donkeys, and other animals has also been used for treatment by different cultures (19). In India, cow urine was studied in preclinical trials (20). It was found to contain nitrogen, sulfur, phosphate, sodium, manganese, iron, silicon, chlorine, magnesium, maleic, citric, and tartaric acids, calcium salts, vitamins A–E, minerals, lactose, enzymes, creatinine, and hormones. The authors claimed that the ingredients in cow urine were similar to those in the human body, which is why they thought it could maintain the balance of these substances in humans if ingested, and may even cure some diseases (20). The United States of America has granted patents (Nos. 6,896,907 and 6,410,059) for the medicinal properties of cow urine, with particular mention of its bioenhancer, antibiotic, antifungal, and anticancer properties. Cow urine increased the potency of paclitaxel against MCF-7, a human breast cancer cell line, in *in vitro* assays (US Patent No. 6,410,059) (21). The composition of cow urine is similar to that of other types of urine; it is mainly water (95%) and urea (2.5%), with the remainder made up of minerals, salts, hormones, and enzymes (2.5%) (22). According to a study from India, there was some evidence that cow urine had antioxidant properties and the ability to repair damaged DNA, and was therefore, an effective anticancer therapy (23). In a study of regression of induced papilloma in Swiss albino mice, cow urine reduced the incidence of papilloma, tumour yield, and tumour burden (24). In a study of different types of

cancer, cow urine caused a decrease in the severity of clinical symptoms (pain, inflammation, burning sensation, difficulty swallowing, and irritation) from day 1 to day 8 (25).

None of our cancer patients showed any clinical benefit from the use of camel urine and this was documented as radiological progression, increase in tumour markers, or both. Two of the patients developed brucellosis, and 1 was successfully treated with antibiotics and returned to chemotherapy. There was 1 patient with possible MERS who died undiagnosed. This was not confirmed by laboratory testing but diagnosis of MERS was supported by the clinical and radiological features.

We know that > 95% of urine is composed of water and the remaining 5% is trace elements. The preclinical studies on camel urine were performed on these trace elements. Most of those studies suggested that the effectiveness of camel urine was because of the presence of trace elements that had anticancer activity. However, for the trace elements to have a clinical effect would require consumption of a huge volume of urine, and even then, the trace elements would be diluted. We also know that not all preclinical trials can be translated into clinically beneficial outcomes. It has been reported that only 5 in 5000 medications will progress successfully from preclinical to clinical studies, and only 1 of the 5 will be clinically beneficial, and even that may not be better than existing medication (26).

When we look to the story that happened 1440 years ago, which supported the use of camel urine, it definitely does not describe cancer patients because the patients appeared to have symptoms of a communicable disease that developed over a short period of time. Many Islamic scholars believe that the advice to drink camel urine and milk was specific to those particular people because they were used to the practice, but it was not common among others.

Conclusion

To the best of our knowledge, this is the first study to explore the clinical benefit of camel urine for treatment of cancer patients. All our cancer patients who insisted upon using camel urine did not have any significant clinical benefits and we do not recommend its use. Also, some of our patients presented with serious side effects. Two patients developed brucellosis because of the advice to use raw unboiled camel urine/milk to obtain the maximum benefit. We reported the results from a smaller number of patients than initially planned because we considered it important that promotion of this type of treatment as a traditional medicine should be stopped, because there is no evidence to support it scientifically.

Data availability: All relevant data are available and could be provided upon request to the corresponding author.

Conflict of interest: No conflicts of interest are declared.

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Table 1. Characteristics and outcome of 20 patients who insisted upon using camel urine

Diagnosis	Gen der	Age, yr	Approximate daily amount of urine/milk	Duration of consumption	Evaluation method	Side effects	Outcome
Metastatic cholangiocarcinoma	Male	67	20 ml/milk	3 months	CT, CA 19-9	Brucellosis	Progression and death
Metastatic colon cancer	Male	62	20 ml/milk	4 months	CT, CEA	Brucellosis	Progression returned to chemotherapy Alive
Metastatic colon cancer	Fem ale	54	20 ml/milk	2 months	CT, CEA	Nausea and bad smell	Progression returned to chemotherapy Alive
Hepatocellular carcinoma	Male	62	20 ml/milk	1 month	CT, AFP	Tolerable	Progression and death
Metastatic nasopharyngeal carcinoma	Male	66	15 ml/milk	3 months	CT	Tolerable	Progression and death
Metastatic pancreatic cancer	Fem ale	70	20 ml/milk	2 months	CT	Bad smell and vomiting	Progression and death
Locally advanced rectal cancer	Male	62	50 ml/milk	6 months	CT, MRI, CEA	Tolerable	Local recurrence Alive
Metastatic gallbladder carcinoma	Male	65	20 ml/milk	4 months	CT, CA 19-9	Tolerable	Progression returned to chemotherapy Alive

Metastatic small bowel clear cell sarcoma	Female	38	20 ml/milk for 1 month then increased gradually to 300 ml for 4 months	5 months	CT	Tolerable	Progression, Alive
Bladder cancer	Male	40	30 ml	3 months	CT	Tolerable	Disease progression Alive
Recurrent glioblastoma	Female	47	50 ml	2 months	CT, MRI	Tolerable	Disease progression Alive
Oesophageal adenocarcinoma (recurrent)	Male	47	30 ml	1 month	CT, CEA	Tolerable	Disease progression Returned to chemotherapy Alive
Metastatic squamous cell carcinoma of the scalp	Female	57	50 ml	3 months	CT	Tolerable	Disease progression Returned to chemotherapy Died
Hepatocellular carcinoma	Male	79	30 ml	4 months	CT, AFP	Tolerable	Disease progression Died
Metastatic colon cancer	Male	63	40 ml	3 months	CT, CEA	Nausea, vomiting	Disease progression Return to chemotherapy Alive
Metastatic Ewing sarcoma	Male	27	200 ml	2 weeks	CT/MRI	Tolerable	Disease progression

							Returned to chemotherapy Alive
Non-small cell lung cancer, squamous cell carcinoma	Male	70	50 ml	4 months	CT	Tolerable	Disease progression Returned to chemotherapy Alive
Non-small cell lung cancer, adenocarcinoma	Male	68	100 ml	3 days	CT	? MERS-Cov	Hypoxia and respiratory failure, bilateral lung infiltrate Died
Metastatic pancreatic cancer	Male	67	60 ml	4 months	CT, CA 19-9	Tolerable	Disease progression Returned to chemotherapy Alive
Locally advanced squamous cell carcinoma of the tongue	Male	60	60 ml	4 months	CT	Tolerable	Disease progression Returned to chemotherapy Alive

AFP = α -fetoprotein; CA 19-9 = carbohydrate antigen 19-9; CEA = carcinoembryonic antigen; CT = computer tomography; MRI = magnetic resonance imaging.