

# The Khash khash Paradox: Mystery of Poppy Seed Consumption Can Trigger False-Positive Opiate Test

Narmeen Agha<sup>1</sup>, Hafiza Touseef Sayyar<sup>2</sup>, Khalid Aziz<sup>2</sup>, Najmul Sahar Ilyas<sup>3</sup>, Uzma Shabbir<sup>4</sup> and Attique Hussain Khan<sup>4</sup>

## ABSTRACT

**Objective:** To identify the knowledge and perceptions of participants regarding the poppy seeds (khash-khash) consumption and false-positive opioid urine test results and related consequences

**Study Design:** Cross-sectional study

**Place and Duration of Study:** This study was carried out in major urban cities of Pakistan from August to November 2025.

**Methods:** A structured questionnaire based at Google Forms was shared with 384 participants. The questionnaire contained 3 sections that measured demographic variables, knowledge and perceptions of participants regarding poppy seed (khash-khash) consumption, false-positive opioid urine test and related consequences. Subsequently, twenty participants of different age groups were selected who regularly consumed poppy seeds provided urine samples at 6 and 24 hours after ingestion. Samples were first screened for opioids using enzyme immunoassay (EIA).

**Results:** The results demonstrate that (89.84%) participants reported widespread consumption of poppy seeds. Nonetheless, awareness of the risk of false-positive results was extremely low. A large proportion of the respondents (77.6%) lacked the awareness that poppy seeds lead to a false positive urine test for opioids. Moreover, 51.2% of the participants felt that the current urine drug tests are not adequate to distinguish between the use of opiates and consumption of poppy seeds. Majority of the participants were of the opinion that this false positive opioid drug can result in dismissal, emotional distress, legal actions and loss of reputation. All participants who regularly consumed poppy seeds were confirmed to have false positive urine test for opioids. Urine tests of opioids were detected to be false positive using enzyme immunoassay (EIA) with a cutoff of 300 ng/mL, and positive results were confirmed using LC-MS/MS.

**Conclusion:** This study confirms a significant awareness gap and validates poppy seed-induced false-positive opiate tests. Targeted education and policy-level improvements in drug testing protocols are urgently needed to ensure fairness and accuracy.

**Key Words:** Drug testing, Urine analysis, false positive, Khash-khash, Opioids, Pakistan, Perceptions, Poppy seed

**Citation of article:** Agha N, Sayyar HT, Aziz K, Ilyas NS, Shabbir U, Khan AH. **The Khash khash Paradox: Mystery of Poppy Seed Consumption Can Trigger False-Positive Opiate Test.** *Med Forum* 2026;37(4):65-69. doi:10.60110/medforum.370413.

## INTRODUCTION

Poppy seeds, referred to as "khash khash" in Pakistan, have been utilized for centuries in both traditional

<sup>1</sup>. House Officer / Associate Professor<sup>2</sup>, Bahria University College of Physical Therapy (BUCPT), Baharia University Health Sciences, Karachi Campus.

<sup>3</sup>. Senior Assistant Professor / Senior Lecturer<sup>4</sup>, Department of General Education, Baharia University Health Sciences, Karachi Campus.

Correspondence: Dr. Najmul Sahar Ilyas, Senior Assistant Professor, Department of General Education, Baharia University Health Sciences, Karachi Campus.

Contact No: 0324-3407484

Email: narmeenagha82@gmail.com

Received: December, 2025

Reviewed: January-February, 2026

Accepted: March, 2026

medicine and culinary traditions.<sup>1</sup> The renowned Persian physician Avicenna, in his influential work "The Canon of Medicine," documented the medicinal properties of poppy seeds, in treating various conditions.<sup>2</sup> Opium poppy seeds have been used in the culinary applications of a variety of world cuisines. In Pakistan, they are used in many different types of food: in curry dishes, deserts and drinks, and are appreciated for their nutty flavor and overall cultural significance. Poppy seeds offer numerous benefits, including a rich nutritional profile. In fact, they are an excellent source of essential minerals, including calcium, iron, and zinc, as well as, dietary fiber and healthy fats.<sup>3</sup> Moreover, poppy seeds are associated with potential health benefits, such as improved digestion, enhanced bone health, and reduced inflammation.<sup>4</sup> They contain substantial amounts of minerals necessary for the human body, calcium, magnesium, potassium, and iron. As well as carbohydrates, vitamins (B and E), Trace

elements (selenium, copper) and also fiber and substances for flavor and fragrance.<sup>5</sup> Their versatility in culinary applications has made them a staple ingredient in many Pakistani households. Poppies (*Papaver somniferum*) represent a major industrial crop grown around the world (Turkey, China, India, Czech Republic, Pakistan), for food (oil-rich seeds) and for medicinal use chiefly because of opium since ancient times<sup>6</sup>. These seeds, whether raw or cooked, contain opiate alkaloids, primarily morphine and codeine, along with smaller amounts of thebaine, noscapine, and papaverine.<sup>7</sup>

Despite the fact the seeds do not inherently possess opiates, they can become contaminated with these substances during the harvesting process due to the presence of poppy latex.<sup>8</sup> In many social contexts, such as clinical diagnoses, forensic investigations, and employment screening, drug testing is essential. The accuracy of these tests is paramount, false positives can have adverse effects ranging from legal issues to job loss wrongful accusations to poor medical management.<sup>9-11</sup> This is especially important where certain dietary staples, such as poppy seeds, contain naturally occurring opiates that can trigger false positive results in drug screens.<sup>12</sup> The "khash khash paradox" is a phenomenon that poses a substantial challenge to the interpretation and reliability of drug test results in Pakistan. The present study was designed to investigate the knowledge and perceptions of participants regarding the poppy seeds (khash-khash) consumption and false-positive opioid urine test results and the possible consequences.

## METHODS

The present cross-sectional study was conducted nation-wide in Pakistan from August to November 2025. The survey targeted participants residing in the major Pakistani cities of Karachi, Lahore, and Islamabad. The data was collected using a structured

survey form consisting of eighteen questions, divided into three sections.

This study was reviewed and approved by the Institutional Review Board (IRB) of Bahria University Health Science Karachi (BUHSK) reference number (BUHS-IRB 176/25). The participants were briefed on the purpose of the research and provided consent form at the beginning of the survey. First section contained basic demographics, including gender, age group, current employment status, level of education, and questions regarding dietary behaviors, including consumption of poppy seed. However, section two included questions about poppy seed consumption and knowledge of false positive urine testing for opium due to poppy seed consumption. Section three included questions about consequences of a false positive result of an individual who had never used or been exposed to using drugs.

For the analysis of false positive opiate test, 20 participants (five from each group age) who ingested poppy seeds on daily basis were selected for urine analysis. These participants were used to obtain urine samples at two time points after 6 hours and 24 hours of poppy seeds ingestion. The initial screening was based on opiate screening by enzyme immunoassay (EIA) and was then confirmed by liquid chromatography and mass spectrometry (LC -MS/MS). The qualitative limit was <300 ng/mL above which the result was considered opiate positive in EIA screening.

Statistical analyses were done by using SPSS version 23. Descriptive data were described as frequencies and percentages. The chi-square test was applied with statistical significance  $p < 0.005$ .

## RESULTS

Table -1 shows the demographic data of 384 participants who completed the survey. The sample was predominantly female, at 80.6%, while the majority of participants were between 20 and 30 years of age, accounting for 86.3%, showing a young adult population.

**Table No.1: Demographic characteristics and poppy seed consumption of participants (n=384)**

S.no	Variables	Response type	Frequency (n)	Percentage(%)
1.	Gender	Female	282	80.6%
		Male	68	19.4%
2.	Age	20-30	302	86.3%
		31-40	18	5.1%
		41-50	24	6.9%
		51-60	9	1.7%
3.	Current Occupation	Student	264	75.4%
		Government/public sector employee	28	8%
		Healthcare professional	32	9.1%
		Support service worker	4	1.1%
		Employed	16	4.6%
		Home maker	2	0.6%
4.	Highest level of education	High school	142	41.3%

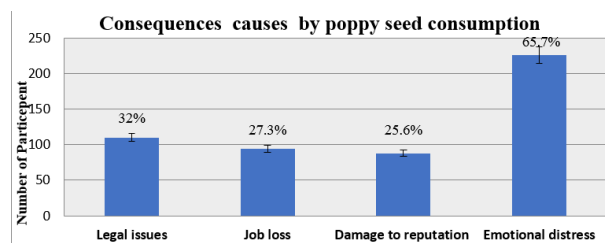
		Bachelors	138	40.1%
		Masters	28	6.4%
		Doctorate PHD	24	7%
		Vocational/technical	6	1.7%
		Others	12	3.5%
5.	Do you consume khash khash (poppy seed) in your diet	Yes	345	89.84%
		No	39	10.15%
6	Do you know that poppy seeds lead to a false positive result on a drug test due to opiates?	Yes	296	77.6%
		No	88	22.9%
	Total (n)		384	

**Table No.2: Participants’ Perceptions Regarding the Sufficiency of Current Urine Drug Testing Methods in Differentiating Poppy Seed Consumption from Illicit Opiate Use**

Response Category	Frequency (n)	Percentage (%)
Not sufficient	216	56.2
Moderately sufficient	148	43.0
Completely sufficient	10	2.9
Disagree	6	1.7
Strongly agree	4	1.2
Total	384	

Perceptions regarding forensic drug testing accuracy revealed substantial concern, with 56.2% of participants considering current urine drug tests insufficient to reliably distinguish poppy seed consumption from illicit opiate use, while only 2.9% perceived them as completely sufficient. Overall, findings demonstrate significant gaps in public awareness and confidence in existing drug testing practices.

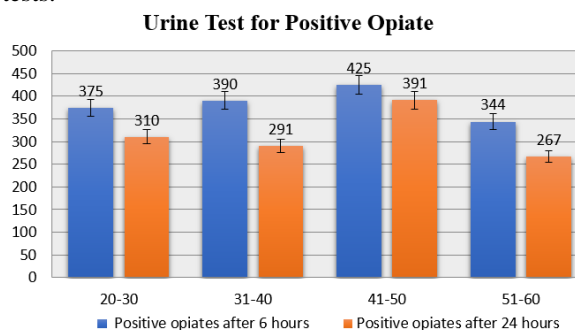
The final section of the questionnaire assessed participants’ opinions and concerns regarding false-positive opiate test results associated with poppy seed consumption. Most participants perceived poppy seed-related false-positive opiate results as a significant concern, with emotional distress, legal consequences, and employment-related risks identified as the most common adverse outcomes as shown in Figure-1.



**Figure No.1: Numerous Consequences causes by poppy seed consumption**

All specimens’ samples showed positive results by enzyme immunoassay (EIA) at 4- 6 hour time point

however opiates remained positive in samples after 20-24 hours. These results suggest that a realistic dose of poppy seeds in the diet may lead to the appearance of opiate in the urine up to 24 hours and may lead to false positive results in the standard urine drug screening tests.



**Figure No.2: Urine Test for Opiate Positive after 6 and 24 hours**

Figure-2 shows that dietary poppy seeds can produce false positive test and detected opiate levels after 6 and 24 hours. The results of the urine opiate concentrations after consuming poppy seeds showed a definite time-dependent decrease in all age groups (Figure 2). At 6 hours of ingestion, mean opiate levels exceeded the screening cutoff (300 ng/mL) across all the age groups. The participants aged 41-50 years had the highest concentrations. These results demonstrate that poppy seed consumption elevates urinary opiate concentrations above immunoassay thresholds for up to 24 hours, effectively invalidating the screening result as a sole indicator of illicit drug use.

## DISCUSSION

The increasing demand in food science and technology has been associated with the rising need of healthy products and food stuffs. Recent studies have highlighted previously overlooked ingredients, such as the poppy plant, which belongs to the Papaveraceae family<sup>13</sup>. The poppy plant, which is traditionally grown to produce oil and opium, has also provided the source of alkaloid that can be used in pharmaceutical

productions.<sup>14</sup> Poppy plant seeds have been used as very important culinary ingredients in savory and sweet dishes such as curry, baked goods, confectionaries, and dessert<sup>15</sup>

The study revealed a widespread lack of public awareness about the fact that consuming poppy seeds can cause false positive results in opiate drug tests, where most of the respondents were unaware of the so called khash khash paradox, despite poppy seeds being commonly part of public dietary practices. This lack of awareness highlights a serious public health and forensic issue, as poppy seeds contain morphine and codeine, which are easily excreted in urine after eating. Interestingly opiates concentrations in the urine may exceed the standard cut-off level of 300 ng/mL.<sup>16</sup> Subsequent intakes of poppy seeds could make it difficult to distinguish between the use of opiates (codeine, heroin, morphine) and the ingestion poppy seeds in the urine drug tests.<sup>17</sup> This is a serious issue and particularly when such results are misinterpreted in areas such as employment checks and forensic investigations where misinterpretation of such results may have some devastating social and legal implications to people in Pakistan.

The protein and oil content in poppy seeds exhibit considerable variation, with protein levels ranging from 21.5% to 23.5% and oil content from 46.2% to 49.4%. Poppy seed oil has a high content of polyunsaturated fatty acids and a relatively high level of  $\beta$ -tocopherol (239-450 mg/kg).<sup>18</sup>

In many areas of the society, drug testing is a crucial part of the employment process, forensic analysis, or even medical determination. High precision of such tests is critical as the false positive test can have extremely grave implications including false incrimination, loss of employment and wrong medical treatment.<sup>19</sup> This is especially relevant in those areas where some food products, e.g. poppy seeds, are known to have naturally occurring opiates that can lead to false positive results on drug.<sup>20</sup> The common presence of poppy seeds in Pakistani cuisine creates a significant hurdle for accurate drug testing. The data suggests that a more compassionate and accurate interpretation of these tests is necessary one that balances chemical evidence with an understanding of local food traditions to protect individuals from being wrongly accused. In particular, the fact that morphine and codeine can be further absorbed into poppy seeds despite the usual culinary treatment and can then be detected in biological samples, which, under the conditions of a highly-stigmatized society against drug misuse, is a legal offense, makes it particularly difficult to balance the socio-economic impact of a false-positive drug test result with the extra confirmatory testing or contextual evidence.<sup>21, 22</sup>

The current result confirms that the consumption of the poppy seed may lead to the production of urine opiate levels that are higher than the typical immunoassay screening cutoff, and especially during the first 6 hours of intake. Despite an overall decrease in concentrations

at 24 hours, some age groups still showed concentrations above the cutoff, as an illustration of inter-individual variation in metabolism and elimination. The greatest and most unremitting levels were found amongst the age group of 41-50 years, indicating the likelihood of being susceptible to prolonged presumptive positivity. Such findings affirm the limitations of immunoassay-based screening as a single method and the need to verify the outcome with highly specific analytical methods such as LC-MS/MS as a possible cause of false-positive opiate urine test results and must be considered when interpreting screening results.<sup>23</sup> False-positive opiate test is potentially devastating to a person breaking their hopes and self-esteem, not only influencing their family and social status.<sup>24,25</sup> Therefore, it is vital to comprehend the widespread nature of this problem and how the population is informed of the fact that the intake of poppy seeds may affect the results of a drug test, hence, the need to develop effective strategies related to the populations and advance the fairness of the legal regulations. It is also indicative of the need to develop improved, more precise testing regimens and clearer protocols on results interpretation, especially in those situations where experimentation on dietary aspects might be involved. Besides, it emphasizes the significance of teaching the masses and those who deal with drug testing in general, on the possibility of false positives and why they should be retested with a confirmatory test before coming up with life-altering decisions based on the initial results.

## CONCLUSION

This study reveals a critical lack of awareness among participants and confirms analytically that poppy seed consumption may yield false-positive opiate urine test results. Immediate implementation of targeted educational programs and policy-level refinement of drug testing practices is essential to ensure accurate interpretation and equitable outcomes.

### Author's Contribution:

Concept & Design or acquisition of analysis or interpretation of data:	Narmeen Agha, Hafiza Touseef Sayyar, Khalid Aziz
Drafting or Revising Critically:	Najmul Sahar Ilyas, Uzma Shabbir and Attique Hussain Khan.
Final Approval of version:	All the above authors
Agreement to accountable for all aspects of work:	All the above authors

**Conflict of Interest:** The study has no conflict of interest to declare by any author.

**Source of Funding:** None

**Ethical Approval:** No.BUHS-I4B#176/25 Dated 28.07.2025

## REFERENCES

1. Joshi S, Venkatesha KT, Gupta AK, Padalia RC, Upadhyay RK, Kumar D, et al. Poppy Seeds (Khus Khus)(*Papaver somniferum*): The Tiny Seed of Flavor and Nutrient Density. In *Fasting Superfoods: Cultivation, Nutrition & Market Potential*. Singapore: Springer Nature Singapore; 2025.p.361-379.
2. Chaudhary SS, Aslam M, Siddiqui A. Tukhm khashkhaash (poppy seeds): A unani drug of multitudinous potential. *J Drug Deliv Ther* 2019;9:528–33.
3. Melo D, Álvarez-Ortí M, Nunes MA, Espírito Santo L, Machado S, Pardo JE, et al. Nutritional and chemical characterization of poppy seeds, cold-pressed oil, and cake: Poppy cake as a high-fibre and high-protein ingredient for novel food production. *Foods* 2022;11(19):3027.
4. Gillani Q, Mehreen A, Bakhtawer R, Humaira U, Afzal A, Mezher MA, et al. Investigating Anti-Obesity Potential of *Papaver Somniferum* Seeds in Obese Rat Model. *J Vis Exp (JoVE)* 2025; (217):e67681. doi: <https://doi.org/10.3791/67681>
5. Gupcsó K, Kókai Z, Bálint M, Tavaszi-Sárosi S, Németh ÉZ. Studies on Sensory and Phytochemical Characteristics of Poppy (*Papaver somniferum* L.) Varieties for Their Oil Utilisation. *Foods* 2023; 12(17):3165.
6. Avula B, Katragunta K, Adams SJ, Wang YH, Chittiboyina AG, Khan IA. Applicability of LC-QToF and microscopical tools in combating the sophisticated, economically motivated adulteration of poppy seeds. *Foods* 2023;12(7):1510.
7. Vale A. Poisoning from non-food grade poppy seeds. *Clin Toxicol* 2023;61(9):625-8.
8. Reisfield GM, Teitelbaum SA, Jones JT. Poppy seed consumption may be associated with codeine-only urine drug test results. *J Analytical Toxicol* 2023;47(2):107-13.
9. Carr J, Hurst J, Broussard LA. Illegal Drug Use or Not—The Role of the Laboratory in Helping to Interpret Drug Test Results. *The J Applied Lab Med* 2024;9(4):855-9.
10. Reisfield GM, Teitelbaum SA, Mathias KT, Jones JT, Lewis B. Extended urinary opiate detection following ad libitum ingestion of poppy seed pastry. *J Analytical Toxicol* 2025:bkaf086.
11. Johnson-Davis KL, Saker SJ, Hubbard JA. Modern drug testing in clinical laboratories: a narrative review of practical approaches and emerging technologies. *J Lab Precision Med* 2025;10:22.
12. De Monnin K, Schalk D, Lewis J, Wilson M. Poppy seeds signal limitations of urine drug testing protocols. *Pain Management Nursing* 2023; 24(5):e81-3.
13. Dasgupta A. Analytical true positive: poppy seed products and opiate analysis. In *critical issues in alcohol and drugs of abuse testing*. Academic Press; 2019.p.449-462.
14. Özgen Y, Bayraktar N, Ozkan U. Phenotypic classification of opium poppy genotypes (*Papaver somniferum* L.) based on morpho-phenological traits. *Scientific Reports*. 2026 Feb 9 doi: <https://doi.org/10.1038/s41598-026-38198-z>
15. Muhammad A, Akhtar A, Aslam S, Khan RS, Ahmed Z, Khalid N. Review on physicochemical, medicinal and nutraceutical properties of poppy seeds: a potential functional food ingredient. *Functional Foods Health and Dis* 2021;11(10):522-47. doi: <https://doi.org/10.31989/ffhd.v11i10.836>
16. Khan S, Khan R, Osama M, Muhammad IN, Iqbal S. Exploring the Acceptance and Perceptions of Herbal Medicine among the General Public in Pakistan: A Societal Perspective. *JPTCP* 2023; 30(4). doi: <https://doi.org/10.21203/rs.3.rs-2633107/v1>
17. Zapašnik A, Pierzgaliski A, Bryła M. Determination of opium alkaloid content in poppy seeds using liquid chromatography coupled with a mass spectrometer with a time-of-flight analyzer (UPLC-TOF-HRMS). *Foods* 2024;13(17):2826.
18. Midtlyng L, Høiseth G, Rahho R, Thaulow CH. Exploring the “Poppy seed defense” in oral fluid: Detection of opioids following poppy seed consumption. *J Analytical Toxicol* 2025: bkaf088. doi: <https://doi.org/10.1093/jat/bkaf088>
19. Morgan J. Wrongful convictions and claims of false or misleading forensic evidence. *J Forensic Sciences* 2023;68(3):908-61. doi:
20. Wilson RJ, Laha TJ, Baird GS, Hoofnagle AN, Liao HC. Pastry precautions: poppy seed-containing products cause significant positive results in urine drug tests. *J Analytical Toxicol* 2023;47(7):644-5.
21. Aykas DP. Authenticity Verification of Commercial Poppy Seed Oil Using FT-IR Spectroscopy and Multivariate Classification. *Applied Sciences* 2024;14(24):11517.
22. Carlin MG, Dean JR, Ames JM. Opium alkaloids in harvested and thermally processed poppy seeds. *Frontiers in Chemistry* 2020;8:737.
23. Ovat DY, Özbunar E, Akin Ö, Sağlam İ, Akgür SA. Monitoring of Morphine in Urine After Consumption of Opium Poppy Sprouts Using Immunoassay and Liquid Chromatography Coupled with Quadrupole Exactive Orbitrap Mass Spectrometry. *J Chromatography Open* 2026:100314.
24. Broussard LA, Carr J, Hurst J. Consumption of seasoning containing poppy seeds can cause codeine positive urine drug test results for pain management monitoring. *J Analytical Toxicol* 2024;48(7):523-5.
25. Reisfield GM, Teitelbaum SA, Jones JT, Mathias K, Lewis B. Urine and hair drug test results associated with daily consumption of codeine-predominant poppy seed food products. *J Analytical Toxicol* 2024;48(1):27-36.