



FEDERATION OF INDIAN PILOTS

FIP/DGCA/26 - 14

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COMPARATIVE STUDY ON ORAL - FLUID TESTING AS A COMPLEMENTARY METHOD UNDER THE INDIAN AVIATION PSYCHOACTIVE-SUBSTANCE TESTING FRAMEWORK

1. EXECUTIVE SUMMARY

The Indian civil aviation sector has expanded considerably in recent years, increasing the need for an effective, scalable and operationally practical system for detecting the use of psychoactive substances among pilots and other safety-sensitive aviation personnel.

The present DGCA framework, under **CAR Section 5 – Air Safety, Series F, Part V**, provides for examination of aviation personnel for consumption of psychoactive substances and requires random testing of applicable personnel, including a minimum annual coverage requirement of 10% for the relevant categories. The present system principally relies upon urine specimens, with screening, confirmatory testing and medical review.

FIP submits that two issues should now be considered together:

- a) **Increasing the frequency and coverage of random psychoactive-substance testing of pilots, and**
- b) **Introducing validated oral-fluid testing as a complementary testing methodology.**

Oral-fluid testing should not be regarded as a replacement for urine testing. Rather, it can provide an additional tool for rapid, directly observable and operationally convenient testing, particularly at airports and other locations where conventional urine collection may cause greater operational disruption.

International regulatory experience demonstrates that oral-fluid testing is already incorporated into regulated transportation and aviation frameworks. CASA Australia expressly provides for oral-fluid drug testing under its aviation framework, while the U.S. DOT permits both urine and oral-fluid specimens under its regulated transportation drug-testing programme.

The UAE GCAA framework also recognises testing of crew members while on duty and provides detailed guidance concerning oral-fluid testing, medical review and laboratory confirmation.

The international comparison therefore supports consideration of a **hybrid Indian model**:

Higher testing frequency + genuine randomisation + oral-fluid screening + urine testing where appropriate + laboratory confirmation + medical review



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2. CURRENT INDIAN DGCA FRAMEWORK

The current Indian regulatory framework is contained in:

CAR Section 5 – Air Safety, Series F, Part V, Issue I, dated 27 September 2021, effective 31 January 2022 – “Procedure for Examination of the Aviation Personnel for Consumption of Psychoactive Substances.”

The CAR applies to relevant aviation organisations including:

- a) Commercial aircraft operators;
- b) Maintenance & Repair Organisations;
- c) Flying Training Organisations;
- d) Air Navigation Service Providers; and
- e) Other personnel/categories covered by the CAR.

For scheduled commercial aircraft operators and Air Navigation Service Providers, the framework provides for random testing of flight crew and requires:

- i. At least **10% annual coverage** of applicable employees;
- ii. Scientifically valid random selection;
- iii. Equal opportunity for selection; and
- iv. Urine-based specimen collection with screening and confirmatory testing.

The existing testing process appropriately recognises that a screening non-negative is not itself a final positive finding. The process proceeds through:

Screening → Confirmatory Testing → Medical Review → Final Determination.

This procedural safeguard should be retained irrespective of the specimen methodology used.

3. WHY THE FREQUENCY OF TESTING SHOULD BE REVIEWED

The principal issue is not merely the testing methodology but **whether the frequency of random testing provides sufficient deterrence and safety assurance.**

A 10% annual testing requirement means that, at population level, only a relatively small proportion of the applicable workforce is tested each year.

For an individual pilot, there may consequently be a substantial period during which the probability of being selected is relatively low.



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FIP therefore recommends that DGCA examine whether the present 10% requirement remains adequate in view of:

- a) The growth of India's airline industry;
- b) Increasing pilot population;
- c) Increasing aircraft fleet;
- d) Increasing flight movements;
- e) Expansion of regional and remote operations;
- f) Increasing operational intensity; and
- g) The safety-critical nature of flight crew duties.

Proposed Indian policy direction

FIP recommends consideration of:

Minimum annual random testing coverage: 25% of pilots

with the important proviso that:

20-25% should be a minimum benchmark for consideration and not a ceiling.

The system should also permit **repeat random selection of the same pilot.**

Testing should be distributed throughout the year and should remain genuinely unpredictable.

4. INTERNATIONAL REGULATORY COMPARISON

Regulatory authority	Aviation/testing framework	Oral-fluid testing	Urine testing	Random testing / surveillance	Key relevance to India
DGCA – India	CAR Section 5, Series F, Part V	Not presently established as the principal DGCA method	Yes	Minimum 10% annual coverage for applicable categories	Existing Indian baseline



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Regulatory authority	Aviation/testing framework	Oral-fluid testing	Urine testing	Random testing / surveillance	Key relevance to India
CASA – Australia	CASR Part 99 / DAMP	Yes	Yes within DAMP framework	Yes – formal random testing regime	Strong aviation precedent for oral fluid and random testing
U.S. DOT / FAA environment	49 CFR Part 40	Yes	Yes	Yes – random, post-accident, reasonable suspicion, return-to-duty and follow-up categories	Strong transportation-sector precedent
GCAA – UAE	Psychoactive-substance / alcohol-drug testing framework	Yes/recognised	Yes	Testing may occur while crew are on duty	Strong aviation-specific operational precedent
GACA – Saudi Arabia	GACAR Part 7 / Part 91	Evidence should be treated cautiously regarding oral-fluid mandate	Testing requirements exist	Post-occurrence and other testing provisions	Useful precedent for post-occurrence controls
CAAS – Singapore	Civil aviation safety framework	Broader Singapore law recognises oral-fluid testing, but this should not be represented	Yes under broader legal framework	Aviation-specific testing arrangements differ from CASA/DOT	Useful legal comparison, but not a direct oral-fluid aviation precedent



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Regulatory authority	Aviation/testing framework	Oral-fluid testing	Urine testing	Random testing / surveillance	Key relevance to India
		as a routine CAAS pilot-testing mandate			

The comparison demonstrates an important point: **not all jurisdictions use oral fluid in the same way**, and India should not simply copy another regulator. Instead, DGCA can develop a model appropriate to Indian aviation while drawing upon international experience.

5. CASA AUSTRALIA – STRONGEST AVIATION PRECEDENT

The Australian **Civil Aviation Safety Authority (CASA)** operates a formal Drug and Alcohol Management Plan framework under **CASR Part 99**. The framework covers persons performing or available to perform safety-sensitive aviation activities and includes a regime for random drug and alcohol testing.

CASA's framework is particularly relevant because oral-fluid testing is expressly incorporated into aviation drug testing.

CASA's regulatory material provides that drug testing may use oral-fluid samples, and its implementation guidance describes the process as:

- a) Specimen collection;
- b) Initial screening; and
- c) Confirmatory testing following a non-negative/detected result.

CASA also specifies applicable Australian standards for testing:

- **AS 4760** – oral-fluid testing; and
- **AS/NZS 4308** – urine testing.

Importantly, CASA's operational material states that drug testing by CASA officers uses **oral-fluid samples**, and testing can occur at aerodromes.

Relevance to India

CASA demonstrates that:



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Oral-fluid testing can be incorporated into a formal aviation safety regime without abandoning confirmatory laboratory testing or medical safeguards.

It therefore provides the strongest aviation-specific precedent for the proposed Indian model.

6. UNITED STATES – U.S. DOT / FAA ENVIRONMENT

The U.S. Department of Transportation's regulated transportation drug-testing system under **49 CFR Part 40** provides another important precedent.

The current framework authorises both:

- a) Urine specimens; and
- b) Oral-fluid specimens.

However, an employer generally selects **one specimen type for a testing event rather than collecting both simultaneously**. Testing must use laboratories meeting the applicable federal certification requirements; point-of-collection instant oral-fluid or urine testing is not authorised under Part 40.

The framework therefore provides a particularly useful lesson for India:

Oral fluid does not have to mean “instant positive/negative testing.”

Instead:

Collection → Screening → Certified Laboratory → Confirmation → Medical/Regulatory Process

can remain the evidentiary chain.

The DOT also has specific requirements concerning qualification of oral-fluid collectors, with subsequent regulatory amendments clarifying collector qualification requirements.

Relevance to India

The U.S. model demonstrates that oral fluid can be introduced without sacrificing:

- Chain of custody;
- Laboratory standards;
- Collector qualification;
- Confirmatory testing;
- Medical review; and
- Regulatory due process.



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7. GCAA – UNITED ARAB EMIRATES

The UAE provides a particularly relevant regional comparison.

Current GCAA material states that a crew member can be subject to substance testing **at any time while on duty within the UAE.**

GCAA guidance also addresses oral-fluid testing and the role of the **Medical Review Officer (MRO).**

The GCAA guidance explains that the MRO reviews laboratory/confirmatory results and evaluates possible medical explanations for drug-test findings. It also recognises oral fluid as a specimen matrix with a relatively recent-exposure detection profile.

Relevance to India

The UAE model is particularly relevant because it demonstrates the importance of combining:

Testing authority + operational availability + laboratory confirmation + medical review.

It also supports the principle that aviation personnel should be subject to testing in circumstances where immediate safety assurance is required.

8. GACA – SAUDI ARABIA

Saudi Arabia's GACA provides another useful comparison.

GACAR Part 7 establishes a framework addressing problematic use of psychoactive substances and prevention/safety programmes.

GACA's operating rules also prohibit a crew member from acting while under the influence of a psychoactive substance to the extent that human performance is impaired.

For the purposes of this comparative study, however, it is important **not to claim that GACA currently mandates oral-fluid testing unless the relevant current regulation expressly establishes such a requirement.**

The Saudi framework is therefore more useful to India as a precedent for:

- a) Psychoactive-substance prevention;
- b) Safety-sensitive personnel controls;
- c) Post-occurrence considerations; and
- d) Operational restrictions.

9. SINGAPORE – CAAS

Singapore should also be treated carefully.



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Singapore's broader legal framework recognises different specimen methodologies, including oral-fluid and urine testing. However, the available material should **not be interpreted as evidence that CAAS currently operates a routine random oral-fluid drug-testing programme for pilots equivalent to CASA Australia or the U.S. DOT framework.**

Singapore is therefore relevant principally as an example of broader legal recognition of different testing matrices rather than as a direct precedent for a CAAS-mandated oral-fluid aviation testing programme.

This distinction is important to maintain the credibility of the FIP study.

10. COMPARISON OF TESTING METHODOLOGIES

Factor	Urine	Oral Fluid
Collection	More involved	Generally simpler
Collection location	Usually requires controlled facilities	Can be conducted at/near workplace
Observation	More controlled collection requirements	Directly observable
Collection time	Potentially longer	Potentially shorter
Crew disruption	Potentially higher	Potentially lower
Airside testing	Less convenient	Highly suitable
Mobile testing	More difficult	More practical
Adulteration/substitution	Greater concern	Reduced opportunity
Detection window	Generally longer	Generally shorter/recent exposure
Rapid screening	Possible	Particularly suitable
Impairment measurement	Does not directly measure impairment	Does not directly measure impairment

The scientific trade-off is important.

Urine may provide a longer detection window, whereas **oral fluid** may be better suited to identifying relatively recent exposure.



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Therefore, neither should automatically be regarded as superior.

The appropriate specimen should depend upon:

- a) Purpose of testing;
- b) Operational circumstances;
- c) Required detection window;
- d) Regulatory requirements;
- e) Medical considerations; and
- f) Laboratory confirmation requirements.

11. Why Oral Fluid is Particularly Relevant to Increased Testing Frequency

The principal policy argument for India is not simply that oral-fluid testing is technologically available.

Its greater importance is that it may allow **DGCA to increase testing frequency without creating a proportionate increase in operational disruption.**

The FIP study provides an illustrative planning model using hypothetical collection times of:

- Urine: 45 minutes;
- Oral fluid: 15 minutes.

Under those assumptions, oral-fluid testing would theoretically reduce collection workload by approximately 66.7%. These figures are **illustrative only and should be validated in an Indian pilot programme.**

The policy implication is therefore:

Higher frequency requires higher testing capacity, and oral-fluid testing may provide a practical mechanism for achieving that capacity.

12. PROPOSED INDIAN HYBRID MODEL

FIP recommends that DGCA consider a four-tier framework.

Tier 1 – Random Oral-Fluid Screening

Use oral fluid for:

- a) Routine random testing;
- b) High-volume testing;
- c) Airport-based testing;



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- d) Targeted testing; and
- e) Selected reasonable-suspicion testing.

Tier 2 – Urine Testing

Retain urine testing for:

- a) Follow-up testing;
- b) Circumstances requiring a longer detection window;
- c) Specific medical/regulatory requirements; and
- d) Cases where DGCA determines urine to be more appropriate.

Tier 3 – Laboratory Confirmation

Every non-negative screening result should undergo appropriate validated laboratory confirmation.

Tier 4 – Medical Review

Confirmed findings should be evaluated through the appropriate aviation-medical process.

This preserves the fundamental principle:

Screening result $\neq$ final determination.

13. PROPOSED INCREASE IN INDIAN TESTING FREQUENCY

FIP recommends that DGCA review the present **10% annual random-testing requirement**.

A possible progressive model could be:

Stage	Annual random coverage
Current DGCA minimum	10%
Proposed initial enhanced minimum	20-25%
Medium-term objective	25-50% , based on risk and experience
Higher-risk categories	Additional risk-based testing
Reasonable suspicion	Additional testing
Post-occurrence	Additional testing



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Stage	Annual random coverage
Follow-up	Additional testing

The percentages above should be treated as **policy proposals for DGCA consideration**, not as claims that international regulators universally prescribe these particular percentages.

Most importantly, the random-selection methodology should allow **repeat selection**.

A pilot selected for testing in January should not automatically become ineligible for selection for the remainder of the year.

14. **PROPOSED TESTING ARCHITECTURE FOR INDIA**

The recommended framework can therefore be represented as:

BASELINE

Minimum 20-25% annual random coverage

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GENUINE RANDOMISATION

Selection throughout the year

↓

REPEAT SELECTION PERMITTED

No one-test-per-pilot-per-year limitation

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ORAL-FLUID TESTING

Rapid and operationally convenient screening

↓

URINE TESTING

Where longer detection window or other requirements justify it

↓

CONFIRMATORY LABORATORY TEST

For every non-negative screening result

↓



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MEDICAL REVIEW

Assessment of legitimate medication and medical factors

↓

FINAL REGULATORY DETERMINATION

15. **Critical Safeguard – Detection is Not the Same as Impairment**

An important principle should remain unchanged irrespective of testing methodology:

Detection of an analyte is not, by itself, proof of impairment.

The FIP study correctly identifies the sequence:

Screening → Specific Confirmatory Analysis → Medical Review → Final Determination.

This is particularly important because some legitimate prescription medicines may be detected within testing panels, while certain initial immunoassay screening methods may produce cross-reactive non-negative results.

A robust framework should therefore combine:

Strong testing + strong confirmation + strong medical review + due process.

16. COST-EFFECTIVENESS SHOULD MEASURE THE WHOLE PROGRAMME

FIP recommends that DGCA not compare oral fluid and urine simply on the basis of **test-kit price**.

The appropriate measure should be the total programme cost, including:

- a) Collection manpower;
- b) Collection facilities;
- c) Laboratory costs;
- d) Transportation;
- e) Crew downtime;
- f) Administrative workload;
- g) Testing throughput;
- h) Airport/mobile deployment; and
- i) Confirmatory testing.



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The relevant metric should therefore be:

Cost per completed and validated test

rather than merely:

Cost per test kit.

The **FIP study similarly proposes assessing testing capacity** in terms of completed tests per collector-hour and measuring operational benefits through crew/employee hours saved, facility savings and logistics savings.

17. PROPOSED DGCA PILOT PROJECT

Before nationwide implementation, FIP recommends a **12-month controlled pilot programme** involving selected:

- a) Airlines;
- b) Airports;
- c) Pilot populations;
- d) DGCA-approved collection agencies; and
- e) Accredited laboratories.

The project should compare urine and oral-fluid testing under actual Indian operational conditions.

PARAMETERS TO BE MEASURED

- 1. Number of pilots tested;
- 2. Testing frequency achieved;
- 3. Percentage of pilots tested more than once;
- 4. Collection time;
- 5. Crew downtime;
- 6. Tests completed per collector-hour;
- 7. Cost per completed test;
- 8. Non-negative screening rate;
- 9. Confirmed-positive rate;
- 10. False/non-confirmatory screening rate;
- 11. Laboratory turnaround time;



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12. Chain-of-custody compliance;
13. Medical-review outcomes;
14. Operator acceptance;
15. Pilot acceptance; and
16. Overall operational impact.

This would enable DGCA to make a **data-driven regulatory decision** rather than relying exclusively upon theoretical comparisons.

18. RECOMMENDED INDIAN REGULATORY MODEL

FIP recommends that DGCA consider the following framework:

Frequency

- a) Increase annual random testing of pilots from the present **10% minimum to at least 20-25%.**

b) Randomisation

Testing should be genuinely random and distributed throughout the year.

c) Repeat Testing

A pilot should remain eligible for selection even after having been tested earlier in the same year.

d) Oral Fluid

Introduce validated oral-fluid testing as a complementary method.

e) Urine

Retain urine testing for appropriate circumstances.

f) Targeted Testing

Provide for reasonable-suspicion and risk-based testing.

g) Post-Occurrence Testing

Strengthen testing following specified accidents and serious incidents.

h) Follow-Up Testing

Provide enhanced testing following confirmed cases and return-to-duty.

i) Confirmation

Require laboratory confirmation of non-negative screening results.

j) Medical Review



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Maintain an independent and appropriately qualified medical-review process.

k) **Quality Assurance**

Require validated devices, qualified collectors, appropriate chain of custody and **accredited laboratories.**

19. **OVERALL COMPARATIVE FINDING**

The international evidence supports several important conclusions.

Finding 1

Oral-fluid testing is not merely an experimental concept.

CASA Australia has incorporated oral-fluid testing into its aviation regulatory framework, while the U.S. DOT permits oral-fluid testing within its regulated transportation drug-testing system.

Finding 2

Oral fluid and urine need not be mutually exclusive.

International frameworks demonstrate that different specimen matrices can be selected according to the testing purpose and operational requirements.

Finding 3

Oral fluid may be particularly valuable for frequent operational testing.

Its collection characteristics make it potentially well suited to airport and workplace environments.

Finding 4

Higher testing frequency is the more important policy objective.

The methodology should be regarded as an enabler of greater testing coverage rather than the objective in itself.

Finding 5

India should retain strong confirmatory and medical safeguards.

A non-negative screening result should not automatically become a final regulatory finding.

Finding 6

India should develop its own risk-based model.

The objective should not be to copy CASA, DOT, GCAA or any other regulator, but to incorporate the most appropriate elements into a framework suited to Indian aviation.



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20. FINAL RECOMMENDATION

FIP recommends that DGCA consider replacing the current **10% annual minimum random-testing concept as the principal benchmark** with a more robust **continuous and risk-based surveillance framework**.

As an immediate step, DGCA may consider increasing random testing of pilots to a **minimum of 20-25% annually**, with repeat selection permitted and testing distributed unpredictably throughout the year.

Oral-fluid testing should then be introduced as a **complementary methodology** to facilitate higher testing frequency, particularly for airport, airside, mobile, random and targeted testing.

The recommended policy can therefore be summarised as:

“Test More, Test Randomly, Test Unpredictably, Test Scientifically.”

The proposed Indian framework should combine:

- 20-25%+ Random Coverage**
- + Repeat Selection**
- + Unannounced Testing**
- + Oral-Fluid Testing**
- + Urine Testing Where Appropriate**
- + Post-Occurrence Testing**
- + Reasonable-Suspicion Testing**
- + Follow-Up Testing**
- + Laboratory Confirmation**
- + Independent Medical Review**

This would provide India with a **modern, scalable and internationally informed psychoactive-substance testing system**, while preserving the fundamental principles of aviation safety, scientific validity, medical confidentiality and procedural fairness.

21. CONCLUSION

The strongest lesson from the international comparison is not simply that oral-fluid testing is available elsewhere. It is that **modern aviation safety systems increasingly require testing regimes that are capable of being frequent, unpredictable, operationally practical and scientifically defensible**.

For India, the immediate priority should therefore be to **increase the frequency and effectiveness of random testing of pilots**, with oral-fluid testing serving as an important technological and operational enabler.



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Such a framework would move the Indian system from a predominantly **minimum-compliance model** towards a **continuous preventive safety-surveillance model**, strengthening deterrence and public confidence while ensuring that every confirmed result continues to receive appropriate laboratory and aviation-medical scrutiny.

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