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Forensic DNA examination in the pandemic era of COVID-19: An Indian Perspective

الفحص الجنائي للحمض النووي DNA خلال جائحة كوفيد 19- من منظور هندي



CrossMark

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Abstract

An extremely high nature of transmissibility and severity of infection due to the novel Corona virus is a serious threat to the mankind. This letter delivers a caution for forensic DNA experts in the era of COVID-19 infection from the Indian perspective. Samples are routinely transported to laboratories without any specific guidelines. Therefore, this is high time to formulate clear guidelines for the handling of biological material, from receiving to processing in the laboratory during such a pandemic.

المستخلص

تشكل طبيعة فيروس كورونا المستجد ذات السرعة الكبيرة في الانتشار والعدوى الخطيرة تهديداً كبيراً للبشرية. لذا، تقدم هذه الرسالة تنبيهاً من منظور هندي للخبراء الجنائيين في مجال الحمض النووي "DNA" خلال فترة انتشار العدوى بفيروس كوفيد - 19. فالعينات يتم نقلها بصورة روتينية إلى المختبرات دون اتباع أي إرشادات خاصة. وتواجه المختبرات العاملة في مجال الفحص الجنائي للحمض النووي "DNA" قيوداً مالية من جانب، كما تواجه أغلبها تأخيرات شديدة في معالجة القضايا الجنائية من جانب آخر. لذا، لا مجال للتأخير في صياغة إرشادات واضحة للتعامل مع المادة البيولوجية بدءاً من استلامها وحتى معالجتها في المختبر خلال هذه الجائحة.

Keywords: Forensic Science, Forensic DNA, COVID-19 Pandemic, India.

الكلمات المفتاحية: علوم الأدلة الجنائية، الحمض النووي DNA، جائحة كوفيد - 19، الهند.



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1. Introduction

An extremely high nature of transmissibility and severity of infection due to novel Corona virus is a serious threat to the mankind. The spread of Corona virus occurs via droplets through air while speaking, coughing and/or spitting. Mouth, nose and eyes have been the predominant entry routes of novel virus in humans [1]. The virus is reported to survive on varied durations on diverse surfaces (Table-1) [2]. To break chain of Covid-19 infection spread, almost all the countries implemented several phases of lockdown, which forced people to remain in their houses which resulted in the domestic violence, increase in sexual offences, thus initiating new challenges for forensic DNA practitioners besides the threat in analyzing evidences during this pandemic. Various biological samples related to varied crimes viz. disputed paternity/maternity/child swapping in hospitals, sexual assault, murder/attempt to murder, and identification of missing person using biological materials are mainly examined in forensic DNA laboratories. Once the virus infects a human, its presence is exhibited in different body fluids (saliva, nasal secretions, blood, vaginal fluid,

Table 1- Persistence of novel Corona virus on varied surfaces [2].

Surfaces	Persistence period
Air	3 hours
Copper surface	4 hours
Cardboard	24 hours
Plastic and Stainless steel	2-3 days

sweat etc.), skeletal remains (bone, teeth, tissues etc.), visceral material, and other tissues, which are the biological materials, received as case exhibits for forensic DNA examinations (Table-2) [3]. As per the Centre for Disease Control and Prevention (CDC) and World Health Organization (WHO) guidelines, all the materials which are received and analyzed during this pandemic should be treated as infectious materials [www.who.org]. There are many references stating that a person may be infectious from few hours to 14 days or more. However, there is no specific literature available that can suggest how long biological material /fluid can remain infectious in an infected person's body [3]. It is also ad-

Table 2- Different types of cases and related biological samples used for forensic DNA analysis.

Types of cases	Biological material received for DNA testing
Disputed paternity/ maternity/ Baby swapping	Blood samples of Child and suspected parent
Sexual Assault	Garments of victim and accused during the crime, vaginal swab smear/ anal swab smear, nail clippings, pubic hairs of victim and urethral swab and smear, nail clippings, pubic hairs of accused and any other possible stains found on the body of victim and accused
Murder, attempt to murder, Identification of missing person in Blast cases	Skeleton / bones, blood, saliva, semen, dried biological stains (blood, semen, saliva, etc.) recovered from crime scene, Blood stained cloth of deceased .and accused, Weapon and any other case related evidential materials



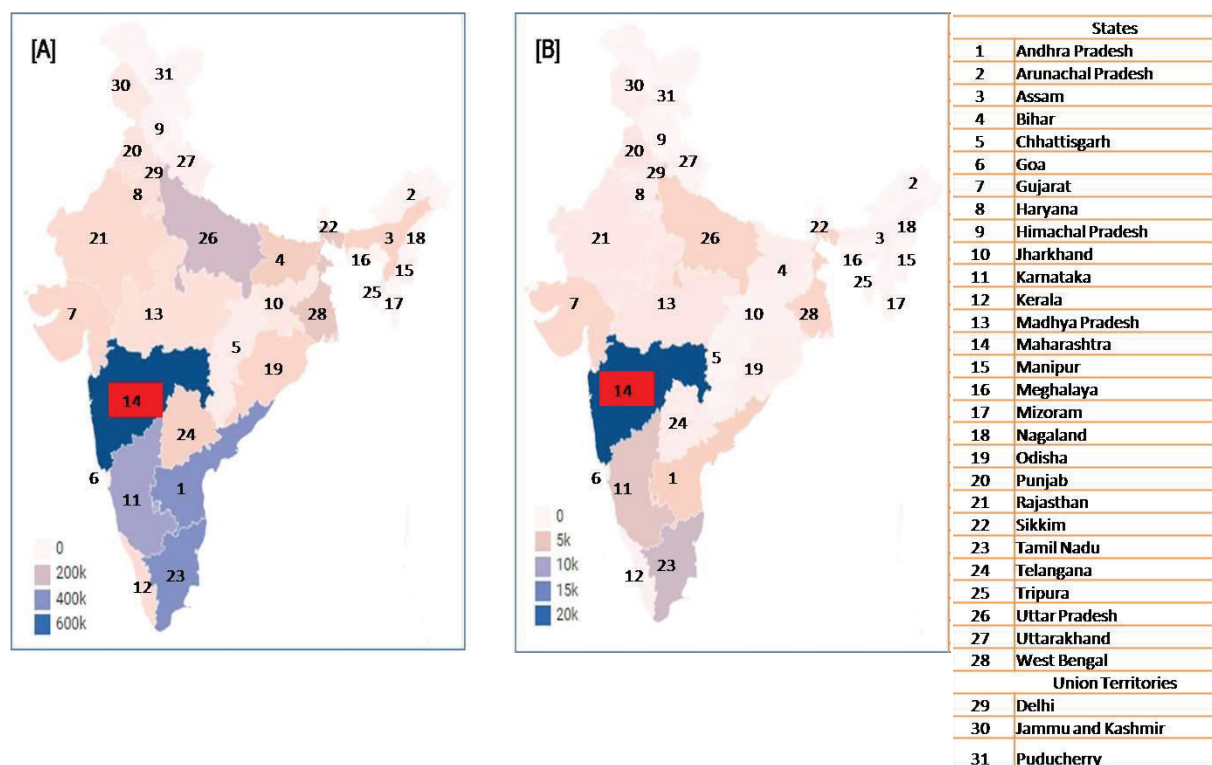


Figure 1- COVID 19 Confirmed cases [A] and mortality in India.

vised by the international agencies to conduct the analysis of these evidences in biosafety cabinets up to the process of extraction of genetic material [4]. As of August 29th, 2020, India reported 722,151 active cases of COVID-19 infection, 3,464,271 confirmed cases and 63,051 deaths due to COVID-19 [www.covidindia.org] (Figure-1). These should not be considered as the actual statistics as the number of testing is still very low, in respect to the total Indian population. In India case exhibits are routinely transported to forensic DNA laboratories without any specific guidelines, even during the three phases of lockdowns of varying time periods. The forensic DNA testing laboratories are facing financial constraints on one hand, and heavy case processing load on the other. This has created demand for priority examination of new registered cases which may be from the infected person. Therefore, this is a high time to formulate clear guidelines for

the handling of biological material from receiving to processing within the laboratory. We speculate that COVID-19 may spread infection to forensic DNA experts during handling of case exhibits during this pandemic.

Suggested Measures:

1. Formation of a central advisory body to cope with the challenges during this pandemic.
2. COVID-19 testing of victims or the deceased should be done prior to handing over the case exhibits for forensic DNA examination.
3. Examination of received dried evidence samples (clothes, weapon of offence, vaginal slides, vaginal swabs, pubic hair etc.) can be delayed for a period of a few weeks at room temperature to avoid any chance of further spread until clarification on the survival of COVID-19 virus is released.
4. Referral sample collection and transport should



be delayed till the generation of DNA profile from the evidence materials.

5. The evidence materials should be transported in a covering which can be removed at the laboratory at the time of receiving evidence.
6. The opening and processing of case exhibits must be done following Biosafety Level 2 (BSL2) laboratory recommendations.
7. Safety norms for the working DNA analysts should be framed and executed.
8. Double regular sanitization of the whole laboratory should be conducted.
9. Specific guidelines concerning disposables should be framed.

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