MATERIAL CHEMISTRY

IC 103

CORONAVIRUS: TRACING, TESTING AND ISOLATION

ACADEMIC YEAR: 2021

MONSOON SEMESTER

VISHESH THAKUR

12041750

ABSTRACT

The topic I chose to make my term paper on is Coronavirus: Tracing, Testing and Isolation as these are the first and the primary steps to contain a huge menace which we currently have in the form of Coronavirus.

Modern technology has developed many innovative methods and algorithms such as Pool Testing, Outpatient Testing, Genomic Testing etc in a very short time. These methods are not only effective but also efficient. Many kinds of tests such as RT-PCR (Reverse Transcription Polymerase Chain Reaction) and PCR have played an important role in the identification of potential carriers of this virus.

INTRODUCTION

The whole world is suffering due to 2019-nCov which is caused by the virus SARS-Cov-2 (Severe Acute Respiratory Syndrome). Early reports by the WHO (World Health Organization) suggested that this virus does not transmits through human contact but soon the world got to know about the reality.

The next obvious step by the government was to trace all the people coming from China and other parts of the world where the virus was supposed to spread rapidly. The people coming from countries such as Italy, Spain, Iran and the USA were traced and isolated.

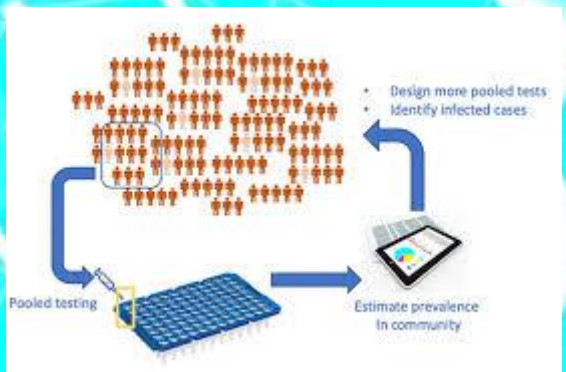
All the major airports of the country were equipped with thermal scanners and PPE (Personal Protection Equipment) and these were made compulsory for the staff and the administration.

Contact tracing programme went on full swing by monitoring the health, the respiratory condition and the body temperature of the potential carriers coming from the aforementioned countries.

The main part after contact tracing is the testing of the suspects. The main tests used in India were Rapid Antigen Testing and the RT-PCR. The problem at hand was that the Rapid Antigen Test gave results quickly within 30 minutes but the probability of giving the correct result was only about 50% and on the other hand the RT-PCR was quite accurate but it took almost a whole day to produce results. So, India had to choose between speed and accuracy.

(TOI)

Due to the slow process of testing the individual samples, new testing algorithms were introduced such as the most famous Pool Testing method. This method makes use of the fact that instead of checking the individual samples, testing a lot of samples will speed up the process. This method is completely discussed in the further section of this paper.



One more challenge in the initial times was the less availability of testing kits and the unavailability of testing centres where the collected swabs were to be tested for the virus. India scaled up the number of it's testing labs from 14 during the starting of the pandemic to over 1596 in August.[2]

Now, after contact tracing and testing the next important step was to isolate the suspects and the patients. Initially 'Herd Immunity' was considered to be an important factor but later it was realized that social isolation would be a much better way to contain the virus. UK which followed herd immunity model is in a great crisis as of January'21.

[3]

(The Hindu)

As of 6th January 2021, a new strain of the Corona Virus is identified in the United Kingdom and 71 cases of the same have been identified in India. In the most unfortunate state, the above-mentioned steps may have to be repeated again. This time we have enough experience and expertise to tackle the situation at hand insightfully.

METHODOLOGY

CONTACT TRACING

People who were in close contact of the person who is suspected to carry the virus is also a potential carrier. These people may come back after visiting a different country. It is a necessity to isolate them from the common public and monitor them for the indications of the virus.

One more step involved in this process is Contact tracing. This involves the identification of the people who came in contact with this person. The steps include:

1. IDENTIFICATION OF THE CONTACTS

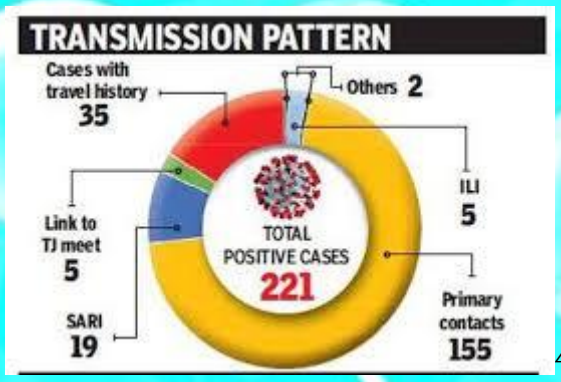
The suspect is asked about his activities and his whereabouts. Then from that data the people in contact are identified.

2. LISTING OF THE CONTACTS

In this all the people identified are followed up and told about the risk they are at and even the damage they can inflict on others.

3. ISOLATION OF THE CONTACTS

Once followed up, these are then isolated and monitored that whether they develop symptoms or not.



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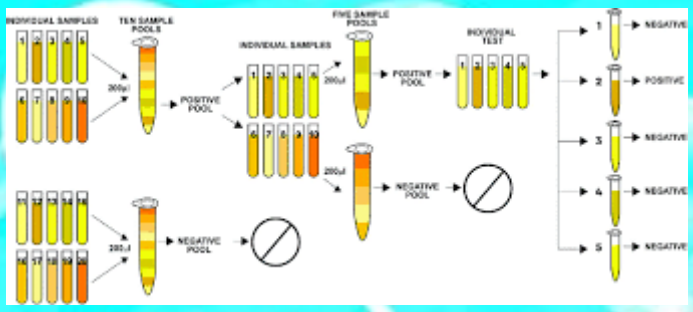
(TOI)

Contact tracing was effectively done in India in early March and April which proved to be highly effective.

TESTING

The next most important thing was testing. India mainly used Rapid Antigen Testing and RT-PCR (Reverse Transcription Polymerase Chain Reaction). Due to the slow and cumbersome procedure of checking each individual separately, Pool Testing algorithm was devised. It included the following methods:

1. First, instead of one by one, the samples were tested as a whole lot i.e., 50 or 100 samples at one time.
2. If the whole sample was clean, the lot was declared to be COVID-19 free but if even 1 sample was positive, the lots were broken in further smaller lots.
3. The same procedure was repeated till last and the name of person was found out at the end of the process.



This method may sound cumbersome but it proved to be highly effective in the fight against Corona Virus. This process mimics the very famous Search Algorithm in programming languages which is Binary Search Algorithm.

WORKING OF RT-PCR TEST

The sample collected from the person's nose or deep throat is washed with chemicals that removes the fat and proteins and then the RNA is extracted which contains the genetic material of the person and the Virus (if any).

Now this extracted RNA is reverse transcribed to DNA and then additional short fragments of DNA is added which are complimentary to some parts of the transcribed viral DNA.

So, if the Virus is present then the fragments attach themselves to target sections of the viral DNA. This sample is then placed in RT-PCR machines which subjects it to various cycles. A typical machine processes the sample to up to 35 cycles.

After each cycle the marker label attaches itself to the DNA strand and releases a sort of fluorescent dye which is measured in real time by a computer. When a certain level of this dye is surpasses, it confirms the presence of the virus.

DISCUSSION

India witnessed a formidable enemy in the form of 2019-nCov and we fought tooth and nail with the limited resources we had, be it short supply of PPE kits or overloaded healthcare facilities. But we improved so much that as of January'21 India is the second largest PPE kit supplier in the World.

(Director of NITI Aayog)

India carried out contact tracing very effectively by making use of innovative apps such as Aarogya Setu, which tracked the location of the user in the real-time and provided near-accurate information about the identified corona cases nearby. This app even prompted for weekly check to identify any potential symptoms. Imposition of timely lockdown proved to be an important part in the spreading of the Virus in the community.

India also increased it's testing capacity from 14 testing centres in February to above 1596 in August. Home to home checking by Aasha Karyakartas also played an important role in identifying the potential carriers of the Virus.

As of 6th January 2021, India has conducted over 177,463,405 tests which is the second higher in the world, only after the USA. All the steps we talked about helped to keep the per million death count of India at one of the lowest in the world. India has a per million death count of 108 while USA stands at a whooping 1,102.

As far as isolation is concerned, many innovative methods were devised. One of them includes the fact trains were converted into temporary isolation wards.

(Officer, National Health Authority (NHA))

So I guess that by the aforementioned facts, figures and methods, we can safely say that India put up a great fight against the Coronavirus by Tracing, Testing, and Isolation.

REFERENCES

1. The Times of India
2. WHO official website
3. The Hindu
4. The Times of India