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Demographic Profile of RT-PCR in Diagnosing COVID-19 Patients for a Period of two years at Virology Laboratory

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Abstract

Introduction: Corona virus belongs to the family of Coronaviridae, in the order of Nidovirales. It is formed by a positive sense single stranded RNA, usually appears spherical with size of 80-120nm and with crown like spikes on the surface. This large family of virus is commonly circulating among vertebrates, such as camels, cats and bats. Novel corona virus COVID-19 has been identified as new strain of corona virus. It can cause viral pneumonia and dyspnea in humans.[1]

Objective: Objective of this study is to analyse demographic aspect of the number of RT-PCR tests performed in the virology laboratory, Department of Microbiology, AIMS, B.G. Nagara for a period of two years i.e, July 2020 To June 2022.

Materials and Methods: Nasopharyngeal and oropharyngeal samples collected from patients were subjected for RT-PCR testing using meril kit results were tabulated based based on different demographic profiles.

Conclusion: In the present study with the overall data the strain causing the second wave was highly communicable and account for the highest infection rate and mortality. Least virulent strain was Omicron that caused third wave. Positivity rate of our district was highest in the month of May 2021 (11.1%). Positivity was high in the age group of 40 years and above.

Keywords: SARS Cov-2; COVID-19; RT- PCR.

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INTRODUCTION

Coronavirus belongs to the family of Coronaviridae, in the order of Nidovirales. It is formed by a positive sense single stranded RNA, usually appears spherical with size of 80-120nm and with crown like spikes on the surface. This large family of virus is commonly circulating among vertebrates, such as camels, cats and bats. Novel corona virus (COVID-19) has been identified

as new strain of corona virus. It can cause viral pneumonia and dyspnea in humans.[1]

The first case of COVID-19 was reported on 31st December 2019, cluster of pneumonia cases of unknown etiology was linked to the seafood market of Wuhan, China.[2,3] China's Centre for disease Control (CCDC) identified the causative agent to be SARS-CoV-2 causing coronavirus disease.[4] World health organization (WHO) Declared it as Public Health Emergency of international concern (PHEIC) on 30th January 2020.[5] The infection spread rapidly affecting 113 countries; over a period of 3 months; thus the infection was declared pandemic on 11th March 2020.[6] Compared to 2002-2003 SARS–Cov and 2012-2014 MERS–CoV epidemics, COVID-19 coronavirus spread rapidly to other parts of world.[7]

In India, first case of COVID-19 was reported when one of the medical students returning from Wuhan University was tested positive in Kerala on January 30, 2020.[8] Indian Council of Medical Research (ICMR) has been leading India's Laboratory surveillance of COVID-19 testing.[8] In the initial phases testing for SARS CoV-2 was conducted through 78 selected national reference laboratories.[9]

The infrastructure for testing included ICMR institutes and partners through the Virus Research and Diagnostics Laboratories (VRDL) Network of the Department of Health Research, Ministry of Health and Family Welfare, New Delhi.[10] This network was established for enhancing India's capacity to diagnose and detect viruses of public health importance (ICMR).[6] Subsequently, on March 21, 2020, the ICMR guidelines allowed testing by private laboratories meeting the stipulated criteria. By April 12, 2020, the ICMR augmented the plan to fast-track COVID-19 testing laboratories and issued revised guidelines to use TruNAT-beta-CoV tests on April 14 and Cartridge-Based Nucleic Acid Amplification Test (CBNAAT) using Cepheid® Xpert® Xpress SARSCoV-2 on April 19, 2020.

Virology laboratory for SARS-CoV-2 testing at Adichunchanagiri Institue of Medical Sciences was established and inaugurated on 3 June 2020 by Poojya Nirmalananda Mahaswamiji. Our laboratory is Accredited and ICMR approved. With a capacity of performing 1000 RT-PCR tests per day. Our laboratory has performed 367541 RT-PCR tests over a period of two years. Laboratory is equipped with One 96 well plate RT-PCR machine, one 32 well pate automated RNA extractor, 3 biosafety class 2A cabinets.

OBJECTIVE

Objective of this study is to analyse demographic aspect of the number of RT-PCR tests performed in the virology laboratory, Department of Microbiology, AIMS, B.G. Nagara for a period of two years i.e, July 2020 To June 2022.

MATERIAL AND METHODS

Samples were received from Various districts of Karnataka i.e, Mandya, Bangalore, Hassan, Tumkur, Davangere and Kalburgi. Patients who were suspected of COVID-19 having initial respiratory signs (including sore throat, shortness of breath), fever, cough, Muscle ache and head ache were included in the study. Suspected ILI(Influenza like illness) and SARI (severe acute respiratory illness) were tested for SARS CoV-2 virus by RT-PCR method.

Data (clinical information and results of RT-PCR for SARS–CoV-2 viral nucleic acid detection) were collected from Laboratory information system. The following information were collected for analysis: (1) Demographic characteristics such as age and gender; (2) Clinical characteristics such as ILI/SARI infection; (3) SARS-CoV-2 RT-PCR characteristics. (4) Month wise positivity rate; Throat and/ or nasal swabs were collected for the SARS Co-2 viral nucleic acid detection in sequential time points.

Real time RT-PCR kit used in our laboratory is Meril COVID-19 one step RT-PCR kit which is ICMR approved. RNA extraction done by EX-RNATM–MAG manufactured by Coral Clinical Solutions.

Sample Requirement:[1]

A separate area has been designated for the collection of COVID-19 samples in the hospital premises.

1. ***SampleType:*** Nasopharyngeal, Oropharyngeal swab specimen, Throat swabs, serum and virus preservation buffer,
2. ***Sample collection:*** collected in accordance with conventional sample collection method.
3. ***Sample storage and transportation:*** Sample to be tested will be processed immediately, or stored at -20±5 C. Avoid repeated thawing and freezing. Sample should be transported with refrigerant packs in sealed Styrofoam

box or ice chest.

RNA Extraction: [11]

RNA extraction is done by EX-RNATM-MAG RNA extraction kit for RT-PCR testing (Magnetic beads method) manufactured by Coral Clinical Systems.

Specimen is mixed with the Lysis/binding Buffer and Magnetic beads during which the specimen is lysed and releases substantial amountof RNA from the cells which binds to magnetic beds, in the next step the RNA bound to the beads are washed with wash Buffer A and B sequentially to remove the salts and proteins. Finally, the Elution Buffer is added to elute the RNA from beads, Eluted RNA can be used for RT-PCR and other molecular testing.

RT-PCR Molecular testing

The kit used is Meril COVID-19 One-step RT-PCR Kit

1. Reagent preparation

1.1 Master mix preparation:

Take out the components from the box and let it thaw at room temperature until equilibrated. Resuspend the lyophilized Enzyme Mix in 400µL Enzyme buffer. Add 500µL RNase-free water and gently pipette up and down. Avoid generating air bubbles. Wash the wall of tube by pipetting to prevent lyophilized powder from remaining. Place the tube aside for 30 min.

1.2 Reaction Mix Preparation:

The recommended sample volume used in the reaction is 5µL or 10µL. Refer to of the columns below to prepare the reaction mix.

1x Volume Required		
Description	**For 5µL Sample**	**For 10µL**
Resuspended master mix	9 µL	9 µL
ORF 1ab/N/ICON Primer and probe(FAM/HEX/ROX)	1 µL	1 µL
RNase- free water	5 µL	–
Total volume	15 µL	10 µL

1.3. Aliquot 15µL (or 10µL, depending on sample volume) of the above reaction mix into the PCR plate of the chosen PCR platform. Aliquot into wells according to the number of samples to be tested, include one well for the positive control and one well for the negative control. Transfer the reaction mix to Sample Processing area.

2. Sample Adding (Performed in Sample Processing Area)

2.1 For 5µL Sample: Add 5µL of the following into appropriate wells according to plate setup: Samples, Positive control, Negative Control.

2.2. For 10µL sample: Dilute positive control with 5µL DEPC treated water to total volume of 10µL. Add 10µL of the following into the appropriate wells according to plate setup: Sample, Diluted Positive control and negative control.

2.3 After adding the samples, cover the lid immediately. Spin down briefly using a centrifuge to remove air bubbles. Transfer the mixture to amplification area.

3. PCR Amplification (Performed in Amplification and Analysis area)

3.1. Place the tubes on the sample holder in the instrument. Setup the test panel according to the position of the positive control and RNA samples.

3.2. Select the detection channels as following:

a) Select FAM (ORF-1ab gene) and HEX (N gene) channels to detect COVID-19 RNA.

b) Select ROX channel to detect internal control.

Step	Temp.	Time	Cycle
Reverse Transcription	50˚C	15 Mins	1
cDNA Initial Denaturation	95˚C	3 Mins	1
Denaturation	95˚C	15 sec	40
Annealing, Extension and Fluorescence measurement	55˚C	40 sec	–
Cooling	25˚C	10 sec	1

3.3 Enter the amplification program Recommended as below:

Save the file and run the reaction.

4. Result Interpretation:

4.1. After the reaction is completed, the results are automatically saved and the amplification curves of the detected target DNA and the internal control are analyzed separately.

5. Quality Control:

5.1. COVID-19 PCR Negative control:

No amplification should be observed in FAM, HEX and internal control (ROX) channel.

5.2. COVID-19 PCR Positive Control:

FAM, HEX and internal control channels Ct≤35

5.3. Internal control (R NaseP):

Internal control (ROX) channels Ct ≤35

5.4. The above requirements must be met same time

same experiment. Otherwise, this experiment is invalid and needs to be repeated.

This assay runs for 40 Cycles.

RESULT ANALYSIS

Target	Ct Value	Interpretation
ORF 1 ab gene (FAM)	Ct≤40	2019-nCov ORF 1ab gene positive
Nucleoprotein N gene	Ct≤35	2019 –nCov Nucleoprotein gene positive
Internal control	Ct≤35	Internal control positive

ORF 1ab gene (FAM)	Nucleoprotein gene (HEX)	Internal control (ROX)	Result interpretation	Action to be taken
Positive	Positive	Positive	SARS-CoV-2 Positive	Reports results to sender and appropriate health authority
Positive	Negative	Positive	SARS-CoV-2 Positive	Repeat the extraction and retest. If again getting Ngene negative, the interpretation is positive
Negative	Positive	Positive	SARS–CoV-2 Negative	Repeat the extraction and retest, If again getting ORF 1ab gene negative, the interpretation is negative
Negative	Negative	Positive	SARS–CoV-2 Negative	Report results to sender
Negative	Negative	Negative	Invalid	Sample should be repeated once again with fresh extraction. If a second failure occurs, it should be reported to sender as invalid and sample recollection is recommended if patient is still clinically indicated.

Table 1: Distribution according to Month wise COVID data

Month	Number	Positivity%
Jul-20	5233	1.4
Aug-20	13648	3.7
Sep-20	10705	2.9
Oct-20	20532	5.6
Nov-20	25702	7.0
Dec-20	23625	6.4
Jan-21	19808	5.4
Feb-21	7729	2.1
Mar-21	1348	.4
Apr-21	13288	3.6
May-21	40856	11.1
Jun-21	30050	8.2
Jul-21	36308	9.9
Aug-21	39925	10.9
Sep-21	21931	6.0
Oct-21	13901	3.8
Nov-21	7370	2.0
Dec-21	1287	.4
Jan-22	26770	7.3
Feb-22	7429	2.0
Mar-22	54	.0
Apr-22	32	.0
May-22	0	0
June-22	0	0

Table 2: Distribution according Age, Sex, Nationality, State, waves, and year wise frequency of COVID 19

Age Group	Number	%
Less than 18 yrs	68765	18.7
18 - 44 yrs	175299	47.7
45 - 60 yrs	80479	21.9
Above 60 yrs	42988	11.7
Sex		
Female	182504	49.7
Male	185011	50.3
Transgender	16	.0
Nationality		
Anguilla	3	.0
Antarctica	2	.0
India	367090	99.9
Kazakhstan	8	.0
Sweden	1	.0
United States	1	.0
No Data	426	.1
State		
Karnataka	367375	100.0
Others	156	.0

Wave time		
June 2020 to Feb 2021 (First Wave)	126982	34.6
March 2021 to July 2021 (Second Wave)	121850	33.2
Aug 2021 to June 2022 (Third Wave)	118699	32.3
Total Samples Year Wise		
2020	99445	27.1
2021	233801	63.6
2022	34285	9.3

Table 3: Distribution according to district wise data in Karnataka State.

District Name	Number	%
Bagalkote	3	.0
Ballari	20	.0
Belagavi	23	.0
Bengaluru Rural	573	.2
Bengaluru Urban	9169	2.5
Bidar	7	.0
Chamarajanagara	18	.0
Chikkaballapura	19	.0
Chikkamagaluru	37	.0
Chitradurga	52	.0
Dakshina Kannada	12	.0
Davangere	856	.2
Dharwad	10	.0
Gadag	3	.0
Hassan	1690	.5
Haveri	3	.0
Kalaburagi	836	.2
Kodagu	21	.0
Kolar	7	.0
Koppal	2	.0
Mandya	346353	94.2
Mysuru	238	.1
Raichur	3	.0
Ramanagara	232	.1
Shivamogga	10	.0
Tumakuru	7167	2.0
Udupi	2	.0
Uttara Kannada	1	.0
Vijayapura	1	.0
Yadgir	5	.0
Mandya	2	.0
Other State	156	.0

Table 4: Distribution according to test results

Test Results	Number	%
Negative	341074	92.8
Positive	26227	7.1
Rejected	230	.06
Total	367531	100

Table 5: Distribution according to Vaccination status, type and doses of the study subjects

Vaccination Status	Number	%
No	343272	93.4
Yes	24259	6.6
Vaccination Type		
No	343272	93.4
Covaxin	7049	1.9
Covishield	17195	4.7
Other Vaccine	15	.0
1st Dose		
No	343272	93.4
Yes	24259	6.6
2nd Dose		
No	354790	96.5
Yes	12741	3.5

The validity and the interpretation of each specimen result according to the results in each channel are given below in tabular form:

If the internal control ROX channel failed to detect Ct or Ct> 35, it indicates that the concentration of tested sample is too low or there is an inhibitory reaction from the interfering substance. Users have to repeat the experiment.

For positive samples and virus cultures, there is no requirement of the internal control results. For negative samples, the internal control should be positive. If the internal control is negative, the test result of the sample is invalid. The cause should be found and eliminated. Users should redo sampling and repeat the experiment.

DISCUSSION

For a period of 2 Years, our laboratory received 367531 samples for SARS CoV-2 RT-PCR testing, of which 367375 was from Karnataka state. Which were 99445 in the year 2020, 233801 in the year 2021 and 34285 in the year 2022. Wave time is divided into first second and third, starting from June 2020 to February 2021, March 2021 to July 2021 and Aug 2021 to June 2022 respectively. Total number

of samples received in the first wave was 126982, second wave was 121850 and third wave was 118699. Maximum number of sample was received in the month of may 2021 with positivity rate of 11% which falls in the second wave.

Among the population highest number of samples were received from 18-44 years age group, accounting for about 47%. Among the Karnataka state samples highest samples receive were from mandya district, which accounted for 94% followed by Bengaluru urban (2.5%) and Tumkur (2%). Of the total samples received for a period of 2 years, a total of 26227 were SARS-CoV-2 positive (7.1%). 230 samples were rejected.

Of per the vaccination received data, only 24259 (6.6%) patients of population were vaccinated with atleast one dose. 12741 (3.5%) were fully vaccinated with 2 doses and the rest of 343272 (93.4 %) population were not vaccinated as on the date of sample collection.

The present study has several limitations that should be taken into consideration. Firstly it's a retrospective study, the accuracy of SARS CoV 2 RT-PCR may vary (improvement of the detection protocol and gain of experience in sampling). Secondly the study investigated only the few dynamic profiles as age, gender and place of sampling while other factors were not taken into consideration.

CONCLUSION

In the present study with the overall data the strain causing the second wave was highly communicable and account for the highest infection rate and mortality. Least virulent strain was Omicron that caused third wave. Positivity rate of our district was highest in the month of May 2021 (11.1%). Positivity was high in the age group of 40years and above.

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Evaluation of the Efficacy of Bacterial Collagenase in Wound Healing

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Abstract

Introduction: The peptides resulting from the collagen degradation by collagenases have wide range of applications including wound healing. However, most of the wound healing studies involve collagenase obtained from anaerobic and pathogenic microorganisms thus increasing the production cost of the same.

Methodology: Earlier in our laboratory, collagenase was isolated and purified from aerobic, non-pathogenic Bacillus altitudinis and it has shown excellent activity in vitro. Thus, the present study was carried out to evaluate the wound healing potential of collagenase isolated and purified from Bacillus altitudinis in murine model. For this, male mice were divided in to 2 groups viz. test group (n=6) and control group (n=6) and burn wound was created on the dorsal side of each mouse with the help of a heated brass bar after exposing the skin. In case of test group purified collagenase (10µg/100 µl) was applied on the burn wound while phosphate buffered saline (100 µl) was applied in case of control group for 5 consecutive days. On day 6th the mice (n =3) were sacrificed from each group and wound biopsies were collected for histopathological examinations

Results: Histopathological examinations showed the absence of epithelium in control group whereas in test group initial signs of regeneration of epidermis were observed. The wound recovery when examined visually and by calculating wound area by using calliper the result showed that the wound was fully recovered. Conclusion: Purified collagenase can be used as therapeutic measure in burn wound healing.

Keywords: Collegenase; Bacillus altitudinis; Burn wound; Mouse model; Histopathological examination.

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INTRODUCTION

Collagenases are unique proteolytic enzymes that are capable of specifically breaking the peptide bond in the triple helical domains of native and denatured collagen.[1] Mostly the collagenases are found in animals and microorganisms however, the existence of collagenases from plant sources has also been described.[2,3] Out of all, microbial collagenases have mainly been used industrially due to their ability to cleave the collagen at several

sites and thus produce numerous active peptides.[4]

Now a days, the importance of collagenases has been extended from industry and has found widespread applications in medical industry as collagen forms one-third of the human body proteins.[5] For medical purposes, the most commonly used microorganism for obtaining collagenase is *Clostridium histolyticum*. Clostridium collagenase has been significantly used for treating Dupuytren's and Peyronie's disease in men[6,7] and uterine fibroids, capsular contracture around the breast implants and removal of human retained placentae in women.[5]

Burn wounds are a necessary public health hassle in the world.[8] According to trustworthy statistics, 2,65.000 deaths happen per year due to burns alone. Usually silver impregnated products such as silver sulfadiazine (SSD) are used for treatment of burn wounds due to its antimicrobial properties. Drawbacks of SSD consist of delayed wound recovery and eschar separation causing a pseudoeschar formation. The delays in wound healing is due to inhibition of nearby keratinocyte and fibroblast development, and suspension in eschar separation is because of the antimicrobial activities of SSD which help to stop the growth and release of bacterial collagenases and proteases.[9] The methods used for debridement are either surgical or mechanical and these methods are less specific and stressful. Clostridium collagenase has been used to dissolve burn scars as a replacement for traumatic surgical debridement.[10] The necrotic dead tissues are perceptively and painlessly damaged by the collagenase enzyme that yield collagen derived peptides leading to enhanced macrophage chemotaxis, increased cytokine secretion and thus enhance wound healing.

While most of the studies of Collagenase production have been reported from anaerobic pathogenic microorganisms, researchers are now looking for non-pathogenic microbial sources to reduce the collagenase production cost. Previously in our laboratory, collagenase had been isolated and purified by gel permeation chromatography (Sephadex G-200) and ion exchange chromatography[11,12] from an aerobic and non-pathogenic microorganism, *Bacillus altitudinis*. Therefore, the current study was further undertaken with an aim to evaluate the wound healing potential of bacterial collagenase isolated from *Bacillus altitudinis*.

MATERIALS AND METHODS

2.1 Microorganism

Bacillus altitudinis used in the present study was already available in the laborartory.[11]

2.2 Isolation and purification of collagenase from *Bacillus altitudinis*

Collagenase was extracted and purified from 72 h old cell culture of Bacillus altitudinis by the method previously standardized in the laboratory.[11,12] Briefly, the cell culture of Bacillus altitudinis was grown in tryptic soy broth, at 37◦C for 72h at 220 rpm. The culture was centrifuged at 10,000 rpm for 15 mins at 4. Further, the collagenase was purified from the supernatant by ammonium sulphate precipitation followed by gel permeation chromatography followed by ion exchange chromatography. To evaluate the purification status, sodium dodecyl sulfate (SDS) polyacrylamide gel electrophoresis (PAGE) was carried out.

2.3 Experimental Animals

Adult BALB/c Mice, 6-8 weeks old, 20-25 gram obtained from Central Animal House, Panjab University, Chandigarh were used in the present study. These animals were housed in polypropylene cages and were randomly divided into 2 treatment groups i.e. test and control group with 6 mice in each group. Mice were kept under standard laboratory conditions with a photoperiod of 12 hour of light & 12 hour of darkness. All the mice were given access to standard pellet diet consisting of 20-21% crude protein, 4% fat, 5.0- 7.5% crude fibre, 8-9% ash, 1.0-1.5% calcium, 0.6-0.8% phosphorus and 50% nitrogen free extract (M/s Ashirwad Industries Pvt. Ltd) and water *ad libitum*. To avoid unwanted variation in results, the animals were acclimatized in the new environment for 5-6 days before performing any experiment.

2.4 Murine burn wound model

2.4.1 Burn wound establishment

Mice were anaesthetized with ether fumes and the hair was shaved from the dorsal side of the mice to expose the skin with the help of a commercially available hair removal cream. The skin was cleaned with a solution of povidine iodine and burn was produced with the help of a heated brass bar (10x10x100mm) for 45 seconds. Immediately after the burn, all the mice were injected intraperitoneally with 0.5ml of sterile physiological saline for fluid replacement to prevent overt shock and analgesic (0.25mg/ml) was given as post burn analgesic in drinking water.[13] The burn injury was confirmed with histopathological examinations.

2.4.2 Collagenase treatment

10µg/100 µl of purified collagenase was applied dermally at the site of burn for consecutive 5 days in case of test group (n=6). While 100 µl of phosphate-buffered saline (PBS) (pH-7.2) was applied in case of control group (n=6) and observed for healing.[14] After that a transparent occlusive dressing such as opsite was done to cover the wound.

2.4.3 Calculation of wound area

The wound area was measured using caliper on day 0, 6, 10, 14, 18 and 22. The wound area was calculated by measuring the horizontal (A) and mid-line (B) diameters of the wound and applying formula: (radius A) × (radius B) × π, wound area of burn wound can be calculated.[15]

2.4.4 Histopathological examination

The regeneration of skin cells was assessed on the basis of histopathological examination. On day 6th, mice were sacrificed from test group (n=3) and control group (n=3) and wound biopsies were collected by excising skin tissue of the burn wound. The tissues were preserved in 10% formalin and then dehydrated with different concentrations of alcohol (70% - 100%). The tissues were embedded, sectioned and stained with hematoxylin and eosin.[16]

RESULTS

Collagenase was isolated and purified from Bacillus altitudinis, with already standardized procedure in our laboratory.

3.1 Collagenase treatment

To determine thewound healing potential of purified collagenase in murine burn wound model, it was applied (10µg/100 µl) for 5 days consecutively on the wound in case of test group whereas in case of control group PBS (100 µl) was applied. Wound recovery was examined visually and by calculating wound area until the wound was fully recovered. The actual wound area of control and test group was 78.5 mm2 square on day 0. After 5 days of treatment, on day 6, the burn wounds treated with PBS (control) showed an average increase in wound area and became circular as compared to original burn wound. However, in collagenase treated burn wound (test), there was no significant increase in wound area, nevertheless granulation tissues appeared at the margins indicating initiation of wound healing. On day 10 and 14, the wound area of control group remained the same while in case of test group the wound area was found to be70.84 mm2 and 50.24 mm^2, respectivelywith contraction in the wound edges. On day 18 no changes were observed in the wound area in case of control group as compared to the test group where the wound area was reduced to 12.56 mm^2 and formation of new tissues started around the burn wound making wound healing more evident. On day 22 the wound gets fully recovered from the burn injury in test group which indicates complete reephithelization however no significant recovery was observed in case of control group (Fig. 1).

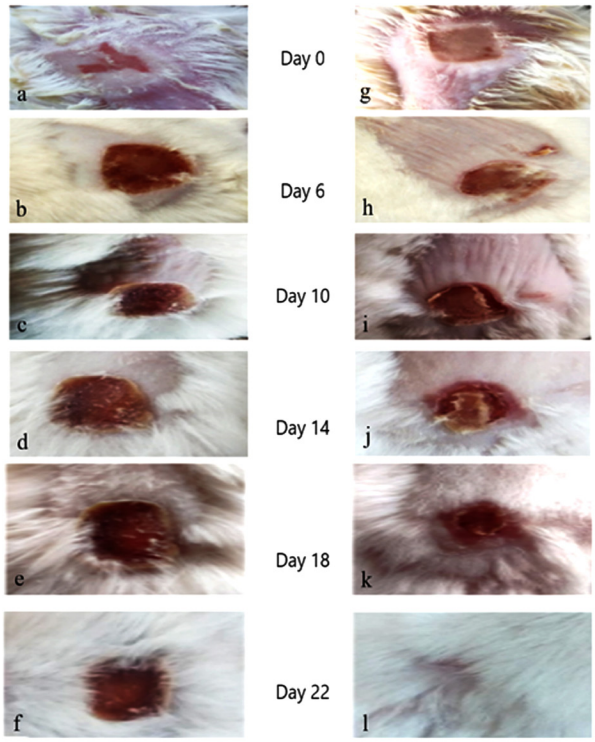

Fig. 1: Photomicrograph showing the wound area of control (a, b, c, d, e, f) and test group (g, h, i, j, k, l)on different days of the study.

3.2 Histopathological results

Analysis of hematoxylin and eosin (H&E) stained sections of wound biopsies on day 6th of control group showed presence of ulcer at the wound and normal skin junction and absence of epithelium whereas the test group showed the initial signs of regeneration of epidermis with presence of inflammatory infiltrate (Fig. 2).

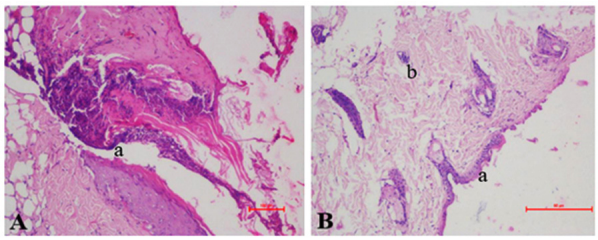

Fig. 2: Photomicrograph of burn wound on 6th day: A. Control group a)ulcer at burn wound and normal skin junction with no epithelium; B. Test group (a) regeneration of epidermis, (b) inflammatory infiltrate

DISCUSSION

Burn wounds are the major problem in medical maintenance worldwide. Over the past few decades, different techniques have been established for wound healing, which include debridement, irrigation, provision of giving of antibiotics, tissue grafts, and use of proteolytic enzymes for the treatment of chronic wounds.[17] In an injury when the wound becomes chronic, it causes a significant amount of load on the patient and affects the lifespan, wellness, and physical abilities.[18] Wound dressings play an important role in the treatment of different kinds of exposed wounds (e.g. traumatic, thermal, or chronic), except when the wound bed is provided with conditions like moisture, nutrition, and warmness, and then growth of microbes start to begin and the process of wound healing is halted by the colonization of bacteria and succeeding to cause an infection, which would eventually cause an extreme and prolonged inflammatory response.

Debridement is the elimination of irrelevant substances along with devitalized or contaminated tissue from a wound bed for improvement in wound healing. This method, can be done surgically, chemically, mechanically, or by autolytic removal of the tissue and is an important factor in wound bed preparation.[19] Major problem in medical practice is the care of non-healing wounds[20], and from last few years finding its cure has been the main goal for the researchers.[21] Enzymatic debridement using collagenase is the most commonly used method of debridement of wound healing.[22] However, enzymatic methods appear to be barely extra tremendous in treatment of wounds because clostridial collagenase used in treatment of wound debridement proved to be expensive and needs a good investment. Herein, we demonstrated the wound healing capacity of bacterial collagenase isolated from a non-pathogenic and aerobic strain Bacillus altitudinis using in vivo model.

The collagenase enzyme is responsible for proteolysis of collagen, is essential for several biological functions such as tissue remodeling, morphogenesis, and wound healing.[23,24] In the present study, we had done the dermal application of the purified collagenase daily for 5 days in murine model to burn wound site in test group and PBS in the control group. The purified collagenase promoted re-epithelization and accelerated wound healing in the test group as compared to control group which showed delay in the appearance of granulation tissue. An in vivo experiment performed by 14 observed that the purified collagenase could potentially aid in wound care and healing in rat model. Hence proving that collagenases have a countless potential for their therapeutic effect in wound care.

Histopathological examinations, on day 6th showed that the process of healing was better in the collagenase treated group that is test group than the control group with PBS treatment. It revealed that the purified collagenase in test group hastens the process of epithelial repair and formation of granulation tissue as compared to the control group however inflammatory infiltrate was present in the both groups. These results are in concordance with 25, wherein they showed that the healing of burned wound skin in rats was better in collagenase than the other groups treated with silver sulfadiazine (SSD) and cold cream.

The rate of wound healing was significantly different in both the groups on day 10 and 22. The development of epithelium was observed in the test group on 22nd day with fully healed wound whereas in the control group, epidermis was absent and no evident wound healing was observed. Moreover, the mean wound area was significantly reduced to 12.56mm^2 on day 18th from 70.84 mm 2 on day 10th in the test group treated with collagenase in comparison to 78.5 mm^2 in the control group treated with phosphate buffered saline.

Consequently, the data and observations collected in this study indicated that the purified collagenase can be used as dermal application to treat the burn wounds.

CONCLUSION

The rate of epithelization of wound was faster and wound area reduced rapidly, revealing that direct application of purified collagenase to burn site promotes the healing process and improves the wound health in experimental animals.

Conflict of interest

The authors declare that there is no conflict of interests.

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Review Article

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A Study to assess the Quality of Life and Coping Patterns of Patient's with Pulmonary Tuberculosis

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Abstract

Introduction: One review aimed to assess personal satisfaction and methods of dealing with particularly difficult times in patients with chronic pulmonary tuberculosis.

Methodology: The research approach taken for the study was an intriguing approach, as the researcher had planned to evaluate. An informative study design was chosen as the research design for the current review.

Results: Personal satisfaction in patients affected by chronic disease has emerged as an empowering tool and is even considered the best tool for assessing response to therapy and clinical consideration.

Conclusion: The present review aimed to assess personal satisfaction and therapies or ways of coping with the burden and ongoing condition of tuberculosis among patients living in a selected local area.

Keywords: Tuberculosis; Evolution; Quality of Life; RNTCP; Respiratory; chronic; Nutrition; Treatment outcome; Directly Observed treatment; Anti-TB drugs; Psychological distress; Counseling.

INTRODUCTION

Breathing problems are inevitable. Respiratory problems are shifting from simple illnesses like common cold and rhinitis to serious illnesses like aspiration tuberculosis, pneumonia, severe respiratory diseases and some more.[1]

Tuberculosis is a stubborn, irresistible disease caused by tubercle bacilli (Mycobacterium tuberculosis). The bacillus was distinguished and illustrated on March 24, 1882 by Robert Koch, who received the Nobel Prize for this discovery. The disease primarily affects the lungs and causes aspiration tuberculosis. It can also affect the digestive tract, meninges, bones and joints, skin, and various tissues in the body. When the microbes are in the lungs, they multiply and cause an aggravation that stimulates neutrophils and macrophages to move to

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the area and overwhelm the microscopic organisms to prevent their spread. If the insensitive system is not impeded, the microbes will remain lethargic forever, but weakened insensitivity could allow the micro-organisms to enter the blood and lymph and contaminate other organs.[2]

The Revised National Tuberculosis Control Program (RNTCP) devotes significant attention to the diagnosis and treatment of diseases in which DOTS is implicated.

Drug safe tuberculosis has recently become an intense topic. Multidrug safe tuberculosis (MDR-TB), a nod to life forms that are essentially immune to drug safe TB, has become an intense topic of late. Multidrug safe tuberculosis (MDR-TB) alludes to life forms that are insensitive to something like two first line drugs. Drug safe tuberculosis has recently become an intense topic. Multidrug safe tuberculosis (MDR-TB) alludes to organic entities impervious to about two of the first line drugs, INH and rifampin, and more recently (incredibly) drug-safe tuberculosis.[1]

The impact of a disease, particularly a chronic disease such as tuberculosis an individual patient is often The Revised National Tuberculosis Control Program RNTCP devotes impressive care to identifying and treating diseases with DOTS. Drug safe tuberculosis has recently become an intense topic. Multi-drug safe tuberculosis (MDR-TB), alluding to life forms that are at least resilient to drug safe TB, has become an intense topic of late. Multidrug safe tuberculosis (MDR-TB) alludes to organic substances that are insensitive to no less than two of the most important drugs. Drug safe TB has recently become an intense topic. Multi pdrug safe tuberculosis (MDR-TB) alludes to beings immune to something like two of the most important drugs, INH and rifampin, especially recently widespread (very) drug safe tuberculosis. The effects of an illness, especially a long term illness such as tuberculosis, on the individual patient are therefore regularly extensive and affect not only his psychological, financial and social well being, but also his actual well being.[1]

Kaplan and Bush propose using the phrase "Wellbeing Related Quality of Life" HRQoL to recognize the impact on well being from various elements affecting a subject's insights (e.g. environmental factors or job performance), and a complicated one, multifaceted development. all-encompassing and affects not only his/her physical health but also his/her mental, economic and social well being.

Kaplan and Bush propose to use the term health-related quality of life (HRQoL) to distinguish health outcomes from other factors affecting a person's cognition (such as environmental factors or job satisfaction) and constitute a complex, multi-dimensional construct.[3]

HRQoL involves assessing a person's view of their physical and emotional well being. Problems, both physical and psychological, are normal in TB patients and, given the limited ability to receive treatment, lead to unfortunate consequences of infection or unfortunate treatment outcomes. While medication alone can cure TB, living with this ongoing infection and its potential effects can be debilitating unless the HRQoL involves collecting a person's impression of their physical and psychological well being. Both physical and mental misery is normal in TB patients, leading to poor disease progression or poor treatment outcomes due to limited treatment options. While drugs alone can cure tuberculosis, unless the victim can develop great survival techniques, living with this ongoing disease and its potential effects can be debilitating.[3] The World Health Organization defined quality of life as an individual's perception of his/her position in life within the cultural context and value system in how they live. Quality of life is also related to one's goals, hopes, standards, and concerns.[6] In addition, it refers to an individual's assessment of his/her satisfaction and meaningfulness in living life.[7]

There are several factors that affect the quality of life of TB patients, including social support, medical factors, psychological factors, demographic factors, and educational and counseling programs.[8] TB patients tend to have poor quality of life and a high risk of experiencing depression.[9] Quality of life can also affect a TB patient's adherence to treatment.[10,11] Previous studies on health relate quality of life of TB patients before 2008 indicated the two major domains of quality of life.[12] However, most studies were focused on the use of only one reported HRQOL. A detailed study was performed on impact of quality of life in TB patients based on a specific sub-group.[13] Although, various standard instruments for HRQOL measurement are available[14] but the reliability, validity and awareness of these instruments in public is still limited. This review described the present scenario of awareness and development for HRQOL measurements in the area of TB research. We aimed to evaluate the most frequently used HRQOL instrument(s) in the patients of TB to demonstrate the properties and general recovery patterns based upon the

Consensus Based Standards for the assortment of health status measurement instruments (COSMIN) checklist.[15]

NEED FOR THE STUDY

Tuberculosis causes an estimated 1.7 million deaths each year and the number of new cases worldwide (more than 9 million) is higher than at any time in history. 22 low and middle income countries account for more than 80% of active cases worldwide. Saharan Africa is disproportionately affected, accounting for four in five cases of HIV associated tuberculosis.[2]

A study was conducted in India to assess adjustment problems and coping mechanisms in patients with pulmonary tuberculosis. 50 consecutive patients with pulmonary tuberculosis were selected. The patients were interviewed with a questionnaire containing 36 closed and open questionnaires.

A review was conducted in India to assess the problems of change and survival strategies in patients with aspiration tuberculosis. Fifty continuous patients with pulmonary tuberculosis were selected. Patients were evaluated through a survey of 36 closed and open ended questions. The results showed that 66% of the patients were perplexed and thought their future was not bright, 60% were affected by the negative reaction of the relatives and their reduced status in the family, 38% of the patients were affected by a reduced working limit, 52% were affected by problems in everyday practice. The strategy for dealing with difficulties or stress that the patient uses, d. H.; Faith in God, family psychosocial support, and clinical consideration had not helped them to cope with their change challenges. Nonetheless, belief in God and clinical reasoning had helped them to cope with their problems with social change. The review assumed that the patient's intrinsic values, such as trust in God, helped build his spiritual strength despite the treatment. The really necessary psychosocial help from the family was essentially lacking in overcoming her change problems.[5]

METHODOLOGY

Research Approach: The research approach followed for this study was an intriguing approach as the investigator planned to evaluate. Personal satisfaction and methods of coping with stress in patients with persistent aspiration tuberculosis living in a selected region in Mangalore.

Research Design: The research design chosen for the current review was an insightful study design. With the objectives of the review in mind, a design was created to enable the agent to examine personal satisfaction and methods of dealing with particularly difficult times in patients with persistent pulmonary tuberculosis residing in a selected region in Mangalore.[2]

VARIABLES

Dependent Variable: A dependent variable is the effect of the activity of the independent variable and cannot exist alone. In the current review, the dependent variables are the personal satisfaction and survival methods of patients with persistent pulmonary tuberculosis.[1]

Demographic Variable: In the current overview, demographic variables are age, orientation, religion, education, occupation, monthly family income, type of family, period of illness, family lineage, related illnesses, source of data.

Research Settings: The setting for the current review is the selected local region in Mangalore.

Population: In this overview, the population includes the patients with chronic pulmonary tuberculosis living in a selected local area in Mangalore.

Test: In the current review, the sample size was 60 patients with persistent pulmonary tuberculosis.

CONCLUSION

- The current review aimed to examine personal satisfaction and methods of coping with difficulty or stress in patients with persistent aspiration tuberculosis living in a selected area of Mangalore. The current review configuration was unmistakable.

The main objective of the review are

- Most of the patientswithwith chronic aspiration tuberculosis were 48.3% between 35 and 44 years old.
- Most patients with persistent pulmonary tuberculosis, i. H. 45% of the examples were Muslim.
- Most of the patients persistent pulmonary tuberculosis, i. H. 41% of monthly family income is >800.[3]

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Review Article

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A Systematic Review on HIV/AIDS

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Abstract

HIV (human immunodeficiency virus) is a virus that attacks cells that help the body fight infection, making a person more vulnerable to other infections and diseases. It is spread by contact with certain bodily fluids of a person with HIV, most commonly during unprotected sex (sex without a condom or HIV medicine to prevent or treat HIV), or through sharing injection drug equipment. If left untreated, HIV can lead to the disease AIDS (acquired immunodeficiency syndrome). HIV is a lifelong condition, but treatments and certain strategies can prevent the virus from transmitting and the disease from progressing. HIV is found in body fluids such as: blood, semen, vaginal fluids and breast milk. It can be passed on through penetrative sex, oral sex and sharing contaminated needles when injecting street drugs or in hospitals. It can also be transmitted from a mother to her baby during pregnancy, childbirth or breastfeeding though many children escape infection. HIV cannot be passed on through kissing, coughing, mosquito bites or touching.

Keywords: Communicable disease; Infection; Immunity; HIV; AIDS.

INTRODUCTION

HIV stands for human immunodeficiency virus, and it attacks immune cells called CD4 cells. These are types of T cells—white blood cells that circulate around the body, detecting infections and faults and anomalies in other cells. HIV targets and infiltrates CD4 cells, using them to create more copies of the virus. In doing so, it destroys the cells and reduces the body's ability to combat other infections and diseases. This increases the risk and impact of opportunistic infections and some types of cancer. Acquired immunodeficiency syndrome (AIDS) is a chronic, potentially life threatening condition caused by the human immunodeficiency virus (HIV). By damaging your immune system, HIV interferes with your body's ability to fight infection and disease.

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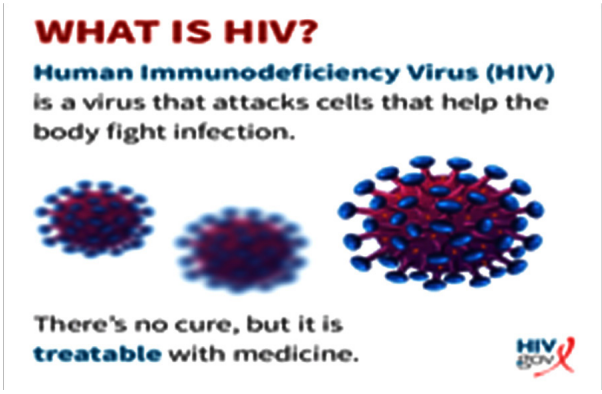

Source: https://www.hiv.gov/hiv-basics/overview/about-hiv-and-aids/what-are-hiv-and-aids

HIV is a sexually transmitted infection (STI). It can also be spread by contact with infected blood and from illicit injection drug use or sharing needles. It can also be spread from mother to child during pregnancy, childbirth or breastfeeding. Without medication, it may take years before HIV weakens your immune system to the point that you have AIDS.

HIV is an infection that harms the insusceptible framework. The resistant structure enables the body to fend off diseases. Untreated HIV taints and slaughters CD4 cells, which are a kind of immune cell called T cells. The infection doesn't spread in air or water, or through easy going contact.

HIV TRANSMISSION FACTS

Anyone can contract HIV. The virus is transmitted in bodily fluids that include:

- Blood
- Semen
- Vaginal and rectal fluids
- Breast milk

Some of the ways HIV is transferred from person to person include:

- Through vaginal or anal sex the most common route of transmission.
- By sharing needles, syringes, and other items for injection drug use.
- By sharing tattoo equipment without sterilizing it between uses.
- During pregnancy, labor, or delivery from a pregnant person to their baby.
- During breastfeeding.
- Through "premastication," or chewing a baby's food before feeding it to them.
- through exposure to the blood, semen, vaginal and rectal fluids, and breast milk of someone living with HIV, such as through a needle stick.

The virus can also be transmitted through a blood transfusion or organ and tissue transplant.

It's theoretically possible, but considered extremely rare, for HIV to be transmitted through:

- Oral sex (only if there are bleeding gums or open sores in the person's mouth).
- Being bitten by a person with HIV (only if the saliva is bloody or there are open sores in the person's mouth).
- Contact between broken skin, wounds, or mucous membranes and the blood of someone living with HIV.

HIV does not transfer through:

- Skin-to-skin contact
- Hugging, shaking hands, or kissing
- Air or water
- Sharing food or drinks, including drinking fountains
- Saliva, tears, or sweat (unless mixed with the blood of a person with HIV)
- Sharing a toilet, towels, or bedding
- Mosquitoes or other insect

RISK FACTORS

Behaviours and conditions that put individuals at greater risk of contracting HIV include:

- Having condomless anal or vaginal sex.
- Having another sexually transmitted infection (sti) such as syphilis, herpes, chlamydia, gonorrhoea and bacterial vaginosis.
- Engaging in harmful use of alcohol and drugs in the context of sexual behaviour.
- Sharing contaminated needles, syringes and other injecting equipment and drug solutions when injecting drugs.
- Receiving unsafe injections, blood transfusions and tissue transplantation, and medical procedures that involve unsterile cutting or piercing.

- Experiencing accidental needle stick injuries, including among health workers.

PREVENTION OF HIV/AIDS

There's no cure for HIV/AIDS, but medications can control the infection and prevent progression of the disease. Antiviral treatments for HIV have reduced AIDS deaths around the world, and international organizations are working to increase the availability of prevention measures and treatment in resource poor countries.

Individuals can reduce the risk of HIV infection by limiting exposure to risk factors. HIV is not transmitted if a person's sexual partner is virally suppressed on ART, so increasing access to testing and supporting linkage to ART is an important component of HIV prevention.

Protecting yourself from HIV begins with understanding how the virus is spread. The virus can be passed in only certain ways:

- During sex with a person infected with HIV
- By sharing a contaminated needle, such as through illicit drug use.
- From HIV mother to child either during pregnancy, labor or breastfeeding.
- Through a contaminated blood transfusion
- If a pregnant woman knows she is HIV positive, her medical team can now take special steps to help prevent her baby from becoming infected.

Condom Use

Consistent and correct use of the male latex condom reduces the risk of sexually transmitted disease (STI) and human immunodeficiency virus (HIV) transmission. However, condom use cannot provide absolute protection against any STI.

Epidemiologic studies that compare rates of HIV infection between condom users and non-users who have HIV infected sex partners demonstrate that consistent condom use is highly effective in preventing transmission of HIV. Similarly, epidemiologic studies have shown that condom use reduces the risk of many other STIs. However, the exact magnitude of protection has been difficult to quantify because of numerous methodological challenges inherent in studying private behaviors that cannot be directly observed or measured.

CONCLUSION

HIV is a virus that targets and alters the immune system, increasing the risk and impact of other infections and diseases. Without treatment, the infection might progress to an advanced stage called stage 3 HIV, or AIDS. Due to medical advances, people with HIV who have access to quality healthcare and receive appropriate treatment rarely develop AIDS, or stage 3 HIV. The health agencies observe that many people with HIV manage the condition and live long healthy lives. The life expectancy of a person with HIV is now approaching that of someone who tests negative for the virus. However, this only applies if the person takes a combination of drugs called antiretroviral therapy regularly and exactly how their doctor prescribes it.

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Review Article

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Monkeypox: A Public Health Challenge due to a Re-emerging Microbe

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Abstract

Monkeypox is a viral zoonotic disease presenting with symptoms like smallpox, which was first identified in 1970 and continued to occur in Africa. With the global eradication of smallpox in 1980 and subsequent cessation of smallpox vaccination, which also provided protection against monkeypox, this has emerged as the most important orthopox virus infection in humans from the perspective of public health.

Recently, since the beginning of the year 2022, cases of monkeypox have been reported from all six regions of the World Health Organization. As the outbreak continued to grow, the WHO declared the situation as a Public Health Emergency of International Concern and issued temporary recommendations in relation to the outbreak. Newer vaccines have been developed of which one has been approved for prevention of monkeypox.

In India, the Ministry of Health and Family Welfare issued guidelines for management of cases as well as public health and prevention measures to contain the disease and end the outbreak. All healthcare facilities should focus on infection prevention and control measures. The community should be made aware regarding the disease, ways of prevention and home management of cases that do not require hospitalization.

Keywords: Monkeypox; Re-emerging microbe; Resurgence; Public health emergency of international concern; Outbreak.

INTRODUCTION

Monkeypox (MPX) is a zoonotic disease caused by a virus that belongs to the Orthopoxvirus genus of the Poxviridae family. MPX was first discovered in 1958 in colonies of monkeys kept for research, hence the name Monkeypox. Twelve years later, human disease was first identified in 1970 in a 9 month old boy in the Democratic Republic of the Congo, which is a region where smallpox had been eliminated in 1968. Since then most cases have been reported in 11 African countries across Central and West Africa.[1]

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Resurgence of Human Monkeypox Disease 2022

With the global eradication of smallpox in 1980 and subsequent cessation of smallpox vaccination,

which also provided protection against monkeypox, this has emerged as the most important orthopox virus infection in humans from the perspective of public health.[1]

In 2003, the first MPX outbreak outside Africa was reported in the United States of America which was linked to contact with infected pet prairie dogs that had been housed with Gambian pouched rats and dormice imported into the country from Ghana.[2]

MPX is currently a disease of global public health importance as it not only affects countries in West and Central Africa, but has started appearing in rest of the world. Since 1st January 2022, cases of monkeypox were reported to the World Health Organization (WHO) from countries across all six WHO regions. A high proportion of these cases were reported since 13th May 2022, from countries without previously documented MPX transmission. This is the first time that cases and sustained chains of transmission have been reported in countries without direct or immediate epidemiological links to areas of West or Central Africa. Confirmation of even one case of MPX, in a country, is considered an outbreak. The unexpected appearance of MPX in several regions in the initial absence of epidemiological links to areas in West and Central Africa, suggests that there may have been undetected transmission for some time.[3]

As the outbreak continued to grow, with more than 16,000 cases reported from 75 countries and territories, and five deaths, on 23rd July 2022 the situation was declared as a Public Health Emergency of International Concern (PHEIC) by the WHO and temporary recommendations were issued in relation to the outbreak.[4] As of 13th September 2022, a total of 59,179 laboratory confirmed cases, including 19 deaths, have been reported from 104 countries/areas/territories. Of these, 58,602 cases including nine deaths are from seven locations that have not historically reported MPX while 577 cases including ten deaths are from three locations that have historically reported MPX cases.[5] WHO has assessed the overall global risk as moderate. WHO Regional risk has been declared as high in European Region; Moderate in African Region, Region of the Americas, Eastern Mediterranean Region, Southeast Asia Region; and Low-Moderate in Western Pacific Region.[3]

The first case of MPX in WHO South-East Asia Region was reported from India on 14th July 2022, in a 35-year-old man who arrived from the Middle East earlier in the week.[6] Till 13th September 2022, a total of 18 cases and one death related to it have been reported in South-East Asia Region. Ten of these cases and the single death are from India.[5] Even before identification of the first case, Ministry of Health and Family Welfare (MOHFW) has released guidelines for management of the disease in India.[2]

EPIDEMIOLOGY[1,7]

Monkeypox virus is a zoonotic double strand DNA virus that belongs to the Orthopoxvirus genus of the Poxviridae family. There are two known clades of MPX, one in West Africa (WA) and one in the Congo Basin (CB) region. The CB clade is considered to be more virulent, with a case fatality rate ranging from 1% to 10%, whilst the WA clade has reported an overall lower case fatality rate of <3%. However, mortality in different settings may be considerably different.[1]

The incubation period of MPX is usually 6 to 13 days following exposure but can range from 5 to 21 days. Period of communicability is 1-2 days before the appearance of rash to until all the scabs fall off or subside.[7] The longest documented chain of transmission in a community has risen in recent years from 6 to 9 successive person-to-person infections. This may reflect declining immunity in all communities due to cessation of smallpox vaccination.[1]

Mode of Transmission is as follows:[7]

- Human-to-human transmission is known to occur through large respiratory droplets or secretions from skin lesions, generally requiring a prolonged close contact. It can also be transmitted through direct and indirect contact with body fluids or lesion material of an infected person. Transmission can also occur via the placenta from mother to fetus (which can lead to congenital monkeypox) or during close contact during and after birth.
- Animal-to-human transmission may occur by bite or scratch of infected animals like small mammals including rodents (rats, squirrels) and non-human primates (monkeys, apes) or through eating inadequately cooked meat and other animal products of infected animals. The natural reservoir of monkeypox has not yet been identified, though rodents are the most likely ones. People living in or near forested areas may have indirect or low level exposure to infected animals.

CLINICAL FEATURES[1,7]

Monkeypox is usually a self limited disease with

the symptoms lasting from 2 to 4 weeks. Severe cases occur more commonly among children and are related to the extent of virus exposure, patient health status and nature of complications. Underlying immune deficiencies may lead to worse outcomes. Persons younger than 40 to 50 years of age may be more susceptible to MPX due to cessation of smallpox vaccination campaigns globally after eradication of the disease. Complications can include secondary infections, bronchopneumonia, sepsis, encephalitis, and corneal infection with ensuing loss of vision. The extent to which asymptomatic infection may occur is unknown.[1]

MPX presents with symptoms like smallpox, but of less clinical severity. The disease can cause a range of clinical signs and symptoms and goes through several phases.[7]

- Initial phase of clinical illness typically lasts for 1 to 5 days, during which time patients may experience fever, headache, back pain, muscle aches, lack of energy and lymphadenopathy, the latter being a distinctive feature of this disease.
- This is followed by appearance of rash 1 to 3 days after fever subsides. MPX rashes present in sequential stages – macules, papules, vesicles, pustules, umbilication before crusting over and desquamating over a period of 2 to 3 weeks. The lesions range in size from 0.5 to 1 cm in diameter and from a few to several thousand in number. The eruption tends to be centrifugal, starting on the face and extending towards the palms and soles of the hands and feet, and can involve the oral mucous membranes, conjunctiva, cornea and/or genitalia.
- Severe and life-threatening complications, though uncommon, may occur like serious skin lesions including cellulitis, abscesses, necrotizing soft tissue infections; severe pneumonia and respiratory distress; corneal infection which may lead to loss of vision; loss of appetite, vomiting and diarrhoea leading to severe dehydration, electrolyte abnormalities and shock; cervical lymphadenopathy which may further lead to retropharyngeal abscess or respiratory compromise; and life threatening conditions like sepsis, septic shock, encephalitis and death.

Blood picture shows leucocytosis, elevated transaminases, low blood urea nitrogen and hypoalbuminaemia, lymphocytosis and thrombocytopenia.[7]

Differential Diagnosis includes Varicella (Chicken pox), disseminated herpes zoster, disseminated herpes simplex, measles, chancroid, secondary syphilis, hand foot mouth disease, infectious mononucleosis, molluscum contagiosum.[7]

Although most people recover within weeks, severe complications and sequelae have been reported to be more common among those who are unvaccinated for smallpox compared with those vaccinated. To date, the current MPX outbreak is mostly among men who have sex with men (MSM) and those who have reported recent sex with one or multiple partners. Cases have been identified mainly amongst men seeking health services in primary healthcare facilities and sexual health clinics with symptoms similar to other sexually transmitted infections. Most reported deaths have occurred in young children and immunocompromised individuals, such as those with poorly controlled HIV.[7]

DIAGNOSIS & MANAGEMENT[2,8]

Guidelines for diagnosis and management have been released by the MOHFW, India, which include case definitions, sample collection and supportive management.

MPX case definitions for surveillance have been outlined for identifying the diseases, which are shown in Table 1.[8]

Table 1: Case definitions for Monkeypox

Type of case	Purpose	Criteria
Suspect case	Screening	A person of any age presenting with: An unexplained acute rash* anywhere over the body *One or more of the following signs or symptoms:* a. Swollen lymph nodes b. Fever c. Headache d. Body aches e. Profound weakness (*Presence of acute onset ano-genital lesions may specifically be ascertained)

Probable case	Sample collection, testing and isolation	A person meeting the suspected case definition and has an epidemiological link with a confirmed case (Direct physical contact with skin or skin lesions or body fluids or sexual contact; Face-to-face exposure, Health care workers without appropriate personal protective equipment (PPE); Contact with contaminated materials such as clothing, bedding or utensils). or A clinically compatible case.
Confirmed case	Management	A case which is laboratory confirmed for monkeypox virus (by detection of unique sequences of viral DNA either by polymerase chain reaction (PCR) and/or sequencing).

Source: (8)

Clinical samples from travellers from outbreak/endemic region or community transmission should be collected from the cases as per the criteria mentioned in Table 2.[2]

Table 2: Clinical samples from travellers from outbreak/endemic region or community transmission.

Type of case	Clinical samples to be collected	
Asymptomatic	• Observe the person for development of any signs and symptoms for 21 days' post exposure • If signs and symptoms develop, collect specimens as per the duration of illness as mentioned below	
Symptomatic	**Rash phase**	**Recovery phase**
	• Lesion roof - with scalpel or plastic scrapper collected in plain tube	• Blood collected in SSGT (4-5 ml)
	• Lesion fluid - with intradermal syringe	• Urine in sterile urine container (3-5ml)
	• Lesion base - scrapings with sterile polyester swab collected in plain tube	
	• Lesion crust - in plain tube	
	• NPS/OPS - in dry plain tube [without any bacterial medium or VTM]	
	• Blood - collected in SSGT (4-5 ml)	
	• Blood - collected in EDTA (2-3ml)	
	• Urine - in sterile urine container (3-5ml)	

* The specimens from lesion should be collected from multiple sites

Source: (2)

Confirmation of diagnosisis done at National Institute of Virology (NIV), Pune under Indian Council for Medical Research (ICMR) in the following manner:[2]

a) PCR for Orthopoxvirusgenus (Cowpox, Buffalopox, Camelpox, Monkeypox).

b) Monkeypox specific conventional PCR or real time PCR for Monkeypox DNA, if specimen is positive for the Orthopoxvirus.

c) Virus isolation and the Next Generation Sequencing of clinical samples (Miniseq and Nextseq) for characterization of the positive clinical specimens.

All the clinical specimens should be transported to the Apex laboratory of ICMR-NIV Pune routed through the Integrated Disease Surveillance Programme (IDSP) network of the respective district/state.

Principles of management include protection of compromised skin and mucous membranes; Rehydration therapy and Nutritional support; Symptom alleviation; Monitoring and treatment of complications. Supportive management is shown in Table 3.[2]

Table 3: Supportive management of Monkeypox

Management components	Symptoms/signs	Management measures
Protection of compromised skin and mucous membranes	Skin rash	• Clean with simple antiseptic • Mupironic Acid/Fucidin • Cover with light dressing if extensive lesion present • Do not touch/ scratch the lesions • In case of secondary infection relevant systematic antibiotics may be considered
	Genital ulcers	• Sitz bath
	Oral ulcers	• Warm saline gargles/ oral topical anti-inflammatory gel
	Conjunctivitis	• Usually, self-limiting • Consult Ophthalmologist if symptoms persist or there are pain/ visual disturbances
Rehydration therapy and nutritional support	Dehydration due to poor appetite, nausea, vomiting, diarrhoea	• Encourage ORS or oral fluids • Intravenous fluids if indicated • Encourage nutritious and adequate diet
Symptom alleviation	Fever	• Tepid sponging • Paracetamol as required
	Itching/pruritus	• Topical Calamine lotion • Antihistaminics
	Nausea/vomiting	• Consider anti-emetics
	Headache/ malaise	• Paracetamol and adequate hydration

Source: (2)

PUBLIC HEALTH & PREVENTIVE MEASURES[2]

Prevention of transmission of infection involves several measures viz. isolation of suspect and confirmed cases; infection prevention and control at healthcare facility as well as at home; tracing and monitoring of contacts; and risk communication to community.

Isolation of Suspect and Confirmed Cases

All suspect and confirmed cases should be isolated and isolation precautions should be continued until all lesions have resolved and a fresh layer of skin has formed. Affected individuals should avoid close contact with immunocompromised persons and pregnant women until all crusts are gone.

Infection Prevention and Control at Healthcare Facility

Standard, contact, droplet and airborne precautions should be undertaken in all healthcare settings having patients with fever and vesicular/pustular rash. Early identification and immediate isolation of patient to be done as measure of source control. Surgical mask should be applied if tolerable to the patient and exposed skin lesions should be covered with a sheet or gown. All individuals, including family members, visitors and HCWs should apply standard, contact and droplet precautions. While transporting a patient, the personnel accompanying the patient should wear PPE and disposable linen should be used in the ambulance if available. The ambulance should be cleaned and disinfected with a freshly prepared 1% hypochlorite solution or equivalent before using for other patients.

Healthcare workers should use PPE for all patient contact i.e. disposable gown, gloves, N95 mask, eye goggles, which should be donned before entering the patient's room and disposed of prior to leaving the isolation room where the patient is admitted. Hand hygiene should be maintained following standard steps of hand hygiene, after all contact with an infected patient and/or their environment during care. All masks and any waste contaminated with crusts, secretions, serum or body fluids should be disposed of in yellow bag for infectious waste, in accordance with Biomedical Waste Management Rules 2016.

Infection Prevention and Control at Home

Patients who do not require hospitalization may be managed at home taking proper preventive measures. Patients should be isolated in a room or area separate from other family members. Healthy household members should limit contact with the patient. Patients should not leave the home except for medical care and no visitors should be allowed

at home. Pets and domestic animals should be excluded from the patient's environment.

Patients should wear a surgical mask. If this is not feasible, other household members should wear a surgical mask in presence of the patient. Disposable gloves should be worn for direct contact with lesions and disposed of after use. Skin lesions should be covered to the best extent possible to minimize risk of contact with others.

Contaminated waste such as dressings and bandages should be contained and disposed of in biomedical waste disposable bag. Proper hand washing with soap and water or by using an alcohol based hand rub should be performed by the patient and other household members after touching lesion material, clothing, linens, or environmental surfaces that may have had contact with lesion material.

Laundry e.g. bedding, towels, clothing may be washed with warm water and detergent. Dishes and other eating utensils should not be shared. Soiled dishes and eating utensils should be washed with warm water and dish washing soap. Contaminated surfaces should be cleaned and disinfected. Standard household cleaning/disinfectants may be used in accordance with the manufacturer's instructions.

Contact Tracing and Monitoring

A contact is defined as a person who, in the period beginning with the onset of the source case's first symptoms, and ending when all scabs have fallen off, has had one or more of the following exposures with a probable or confirmed case of monkey pox:

- Face-to-face exposure (including health care workers without appropriate PPE)
- Direct physical contact, including sexual contact
- Contact with contaminated materials such as clothing or bedding

Cases can be prompted to identify contacts across household, workplace, school/nursery, sexual contacts, healthcare, houses of worship, transportation, sports, social gatherings, and any other recalled interactions.

Contacts should be monitored at least daily for the onset of signs/symptoms for a period of 21 days from the last contact with a patient or their contaminated materials during the infectious period. In case of occurrence of fever, clinical/ laboratory evaluation should be undertaken. Asymptomatic contacts should not donate blood, cells, tissue, organs or semen while they are under surveillance. Pre-school children may be excluded from day care, nursery, or other group settings. Health workers who have unprotected exposures to patients with monkeypox or possibly contaminated materials do not need to be excluded from work duty if asymptomatic, but should undergo active surveillance for symptoms for 21 days.

Risk Communication and Preventive Measures

Raising awareness of risk factors and educating people about the measures they can take to reduce exposure to the virus is the main prevention strategy for monkeypox. This includes providing public health advice through the channels that target audiences use, on how the disease transmits, its symptoms, preventive measures and what to do in case of suspect or confirmed infection. This should be combined with targeting community engagement to the population groups who are most at risk, working closely with health care providers, including STD clinics, and civil society organizations.

The key points to prevent infection with monkeypox virus that should be in focus for awareness generation activities are as follows:

- Isolate infected patients from others who could be at risk for infection.
- Avoid contact with any materials, such as bedding, that has been in contact with a patient of monkeypox.
- Practice good hand hygiene after contact with infected persons by washing hands with soap and water or using an alcohol-based hand sanitizer.
- Use masks and gloves when caring for patients.

Vaccination

Vaccination against smallpox was demonstrated through several observational studies to be about 85% effective in preventing monkeypox. Thus, prior smallpox vaccination may result in milder illness. Evidence of prior vaccination against smallpox can usually be found as a scar on the upper arm. At the present time, the original (first generation) smallpox vaccines are no longer available to the general public. Some laboratory personnel or health workers may have received a more recent smallpox vaccine to protect them in the event of exposure to orthopoxviruses in the workplace. A still newer vaccine based on a modified attenuated vaccinia virus (Ankara strain) was approved for

the prevention of monkeypox in 2019. This is a two dose vaccine for which availability remains limited. Smallpox and monkeypox vaccines are developed in formulations based on the vaccinia virus due to cross-protection afforded for the immune response to orthopoxviruses.[1]

Reducing Risk of Zoonotic Transmission[1]

Unprotected contact with wild animals, especially those that are sick or dead, including their meat, blood and other parts must be avoided. All foods containing animal meat or parts must be thoroughly cooked before eating.

Some countries have imposed regulations restricting importation of rodents and non-human primates. Captive animals that are potentially infected with monkeypox should be isolated from other animals and placed into immediate quarantine. Any animals that might have come into contact with an infected animal should be quarantined, handled with standard precautions and observed for monkeypox symptoms for 30 days.

CONCLUSION

Monkeypox is a viral zoonotic disease presenting with symptoms like smallpox, which has recently seen a resurgence following eradication of smallpox and subsequent cessation of vaccination. The disease in humans was first discovered in 1970 and continued to occur in Africa. Recently, since the beginning of the year 2022, cases of monkeypox have been reported from all six regions of the World Health Organization. As the outbreak continued to grow, the WHO declared the situation as a Public Health Emergency of International Concern and issued temporary recommendations in relation to the outbreak.

In India, the Ministry of Health and Family Welfare has issued guidelines for diagnosis and management of cases as well as public health and prevention measures to contain the disease and end the outbreak.

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HIV/Aids & its Social Stigma: A Systematic Review

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Abstract

HIV stands for human immunodeficiency virus. It weakens a person's immune system by destroying important cells that fight disease and infection. The human immunodeficiency virus (HIV) targets the immune system and weakens people's defense against many infections and some types of cancer that people with healthy immune systems can more easily fight off. As the virus destroys and impairs the function of immune cells, infected individuals gradually become immunodeficient. Immune function is typically measured by CD4 cell count.

The most advanced stage of HIV infection is acquired immunodeficiency syndrome (AIDS), which can take many years to develop if not treated, depending on the individual. AIDS is defined by the development of certain cancers, infections or other severe long term clinical manifestations. If HIV is not treated, it can lead to AIDS (Acquired Immunodeficiency Syndrome). There is currently no effective cure. Once people get HIV, they have it for life. Some groups of people in the United States are more likely to get HIV than others because of many factors, including their sex partners and risk behaviors. But with proper medical care, HIV can be controlled. People with HIV who get effective HIV treatment can live long, healthy lives and protect their partners.

Keywords: Virus; HIV; AIDS; Immune; Stigma.

INTRODUCTION

HIV infection in humans came from a type of chimpanzee in Central Africa. Studies show that HIV may have jumped from chimpanzees to humans as far back as the late 1800s. The chimpanzee version of the virus is called simian immunodeficiency virus. It was probably passed to humans when humans hunted these chimpanzees for meat and came in contact with their infected blood. Over decades, HIV slowly spread across Africa and later into other parts of the world. HIV/AIDS has had a large impact on society, both as an illness and as a source of discrimination. The disease also has large economic impacts. There are many misconceptions about HIV/AIDS, such as the belief that it can be transmitted by casual non-sexual contact. In 2021, about 38 million people worldwide were living with HIV and 650,000

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deaths had occurred in that year.

SYMPTOMS

Most people have flu-like symptoms within 2 to 4 weeks after infection. Symptoms may last for a few days or several weeks. Some people have no symptoms at all. The only way to know if you have HIV is to get tested. The symptoms include:

1. Fever & Chills
2. Sorethroat
3. Night Sweating
4. Swollen Lymph Nodes
5. Fatigue
6. Rash
7. Muscle Ache
8. Sores of the mouth and genitals.

STAGES OF HIV

There are four stages of HIV and as with all illnesses, how it progresses, how long it takes and the affect it has on the individual depends on a number of factors for example, general health, lifestyle, diet etc.

Stage 1: Infection

HIV quickly replicates in the body after infection. Some people develop short lived flu-like symptoms for example, headaches, fever, sore throat and a rash within days to weeks after infection. During this time the immune system reacts to the virus by developing antibodies this is referred to as 'sero-conversion'.

Stage 2: Asymptomatic

As the name suggests, this stage of HIV infection does not cause outward signs or symptoms. A person may look and feel well but HIV is continuing to weaken their immune system. This stage may last several years (an average of 8 to 10 years) and without a HIV test many people do not know they are infected.

Stage 3: Symptomatic

Over time the immune system becomes damaged and weakened by HIV and symptoms develop. Initially they can be mild but they do worsen, symptoms include fatigue, weight loss, mouth ulcers, thrush and severe diarrhoea. The symptoms are caused by the emergence of opportunistic infections; they are referred to as opportunistic infections because they take advantage of a person's weakened immune system. Some examples of opportunistic infections are PCP, toxoplasmosis, TB and kaposi sarcoma.

Stage 4: AIDS/Progression of HIV to AIDS

There is no single test for AIDS; doctors will look at a variety of symptoms including the CD4 count, the viral load and the presence of opportunistic infections in order to make an AIDS diagnosis

TRANSMISSION

1. ***Bodily fluids that transmit HIV:*** Only certain body fluids from a person who has HIV can transmit HIV. These fluids include blood, semen (cum),pre-seminal fluid (pre-cum), rectal fluids, vaginal fluids, and breast milk.
2. ***Transmission from one person to another:*** Most people get HIV through anal or vaginal sex, or sharing needles, syringes, or other drug injection equipment (for example, cookers). But there are powerful tools to help prevent HIV transmission.
3. ***Transmission from a mother to her baby:*** HIV can be transmitted from a mother to her baby during pregnancy, birth, or breastfeeding. However, it is less common because of advances in HIV prevention and treatment. This is called perinatal transmission or mother-to-child transmission. Mother-to-child transmission is the most common way that children get HIV. Recommendations to test all pregnant women for HIV and start HIV treatment immediately have lowered the number of babies who are born with HIV. If a woman with HIV takes HIV medicine as prescribed throughout pregnancy and childbirth, and gives HIV medicine to her baby for 4 to 6 weeks after birth, the risk of transmission can be less than 1%.
4. ***Transmission from sharing needles, syringes, or other drug injection equipment:*** People are at high risk for getting HIV if they share needles, syringes, or other drug injection equipment (for example, cookers) with someone who has HIV. Never share needles or other equipment to inject drugs, hormones, steroids, or silicone. Sharing needles, syringes, or other injection equipment increases your risk for getting hepatitis B and hepatitis C, and other infections.

RARE WAYS THAT HIV HAS BEEN TRANSMITTED

Little to no Risk

1. Oral Sex
2. Workplace
3. Medical Care
4. Food Contamination
5. Biting and Spitting
6. There is no risk of transmission through unbroken skin.
7. There are no documented cases of HIV being transmitted through spitting as HIV is not transmitted through saliva.
8. Touching
9. Tattoos and Body Piercings

Factors that Increase the Risk of Getting or Transmitting HIV

1. ***Viral Load:*** Viral load is the amount of HIV in the blood of someone who has HIV. The higher someone's viral load, the more likely that person is to transmit HIV.
2. ***Other Sexually Transmitted Diseases:*** If the person has another sexually transmitted disease (STD), they may be more likely to get or transmit HIV. Getting tested and treated for STDs can lower your chances of getting or transmitting HIV and other STDs.
3. ***Alcohol and Drug Use:*** When a person is drunk or high, you're more likely to engage in risky sexual behaviors like having sex without protection (such as condoms or medicine to prevent or treat HIV). Being drunk or high affects your ability to make safe choices.

HIV Superinfection

When a person with HIV gets another type, or strain, of the virus it is called HIV superinfection. The new strain of HIV can replace the original strain or remain along with the original strain.

Superinfection may cause some people to get sicker faster because the new strain of the virus is resistant to the medicine (antiretroviral therapy or ART) they're taking to treat the original strain. Hard-to-treat superinfection is rare. Taking medicine to treat HIV can help protect someone from getting a superinfection.

PREVENTION

A. Preventionduring sex:

Choose sexual activities with little to no risk

1. Use Condoms the Right Way Every Time You Have Sex
2. Take PrEP: PrEP (pre-exposure prophylaxis) is medicine people at risk for HIV take to prevent HIV.
3. Decide Not to Have Sex
4. Get tested and treated for other STDs
5. If the partner has HIV, encourage the partner to get and stay in treatment

B. Preventionfrom injection drug use:

1. Never share needles, syringes, or other drug injection equipment
2. PrEP pill - PrEP (pre-exposure prophylaxis) is medicine people at risk for HIV take to prevent HIV.
3. Don't have sex when you're high on drugs
4. If you do share needles, syringes, or other drug injection equipment, use bleach to clean them
5. Decide not to inject drugs.

C. Prevention from transmitting HIV to baby:

1. Get Tested for HIV As Soon As Possible to Know Your Status
2. Take Medicine to Prevent HIV if You Do Not Have HIV But Are at Risk
3. Take Medicine to Treat HIV

Post Exposure Prophylaxis

PEP (post-exposure prophylaxis) means taking medicine to prevent HIV after a possible exposure. PEP should be used only in emergency situations and must be started within 72 hours after a recent possible exposure to HIV.

HIV Stigma

HIV stigma is negative attitudes and beliefs about people with HIV. It is the prejudice that comes with labeling an individual as part of a group that is believed to be socially unacceptable.

Like Believing that only certain groups of people can get HIV. Making moral judgments about people who take steps to prevent HIV transmission. Feeling that people deserve to get HIV because of their choices

DISCRIMINATION

While stigma refers to an attitude or belief, discrimination is the behaviors that result from those attitudes or beliefs. HIV discrimination is the act of treating people living with HIV differently than those without HIV.

For example: A health care professional refusing to provide care or services to a person living with HIV. Refusing casual contact with someone living with HIV. Socially isolating a member of a community because they are HIV positive. Referring to people as HIV or Positives.

CAUSES OF HIV STIGMA

HIV stigma is rooted in a fear of HIV. There are still misconceptions about how HIV is transmitted and what it means to live with HIV today. The lack of information and awareness combined with outdated beliefs lead people to fear getting HIV. Additionally, many people think of HIV as a disease that only certain groups get. This leads to negative value judgements about people who are living with HIV.

Effects of HIV Stigma and Discrimination

HIV stigma and discrimination affect the emotional well being and mental health of people living with HIV. People living with HIV often internalize the stigma they experience and begin to develop a negative self image. They may fear they will be discriminated against or judged negatively if their HIV status is revealed.

"Internalized stigma" or "self stigma" happens when a person takes in the negative ideas and stereotypes about people living with HIV and start to apply them to themselves. HIV internalized stigma can lead to feelings of shame, fear of disclosure, isolation, and despair. These feelings can keep people from getting tested and treated for HIV.

Measures to Control HIV Stigma

1. ***Educate healthcare workers:*** Healthcare workers should be given education and training program focusing on reducing stigma and discrimination against young people who access sexual health services.
2. ***Protect the privacy of people who are HIV positive:*** Laws that criminalize HIV non-disclosure, exposure, and transmission deter people from HIV testing, and put the responsibility of HIV prevention solely on the partner living with HIV.
3. ***Remove travel restrictions:*** Between 2008 and 2015, around the world, 24 laws restricting travel and residency for people with HIV were removed. But there is still more work to be done: Brunei, Equatorial Guinea, Iran, Iraq, Jordan, Papua New Guinea, Qatar, Russia, Solomon Islands, United Arab Emirates, and Yemen still categorically refuse entry to people with HIV.
4. ***Support people living with HIV to work through internalized stigma:*** In India, a training program was created where women living with HIV could learn coping and stigma-reduction strategies. In addition to training, some of the women were provided with an ASHA. The ASHAs accompanied the women to health appointments, and gave them advice on how to cope with and address HIV-related discrimination.
5. ***Improve the status of women:*** Women living with HIV are often harshly judged, due to HIV being associated with promiscuity and the gendered double standard that a "good woman" would not engage in activities that could lead to HIV acquisition. Women living with HIV not only experience stigma and discrimination from their friends, family, and community, but also from healthcare workers. They also experience more HIV related stigma than men, including more feelings of negative self image, and more public stigma surrounding how their community views them. A lot needs to be done to improve the status of women worldwide. In the meantime, support groups for women with HIV can help individual women to navigate these challenges.
6. ***Fight inequality and discrimination:*** People who are marginalize, including trans women, men who have sex with men, sex workers, and drug userface legal and social inequities which put them at higher risk of HIV infection. Many people experience multiple forms of discrimination not just that related to their HIV status, but also with respect to gender, sexual orientation, race, etc. This can affect people across many components of their lives.Law changes can help to improve people's health and reduce stigma. But legal advances are not enough, cultural norms also need to change.
7. ***Listen to people living with HIV:*** People with lived experience of a disease or social reality

deserve a voice in decisions that affect them. This means that people with HIV must be at the forefront of the movement to end HIV and AIDS stigma.

8. ***Start with yourself:*** There's a lot to be done to end HIV stigma, but you can help make a difference. Educate yourself and your friends: get the facts about HIV transmission and prevention.

CONCLUSION

HIV/AIDS is the deadliest epidemic of our time. Over 22 million people have already lost their lives, and more than 42 million are currently living with HIV/AIDS. Even if a vaccine for HIV were discovered today, over 40 million people would still die prematurely as a result of AIDS.There is currently no effective cure for HIV. Strategies such as abstinence (not having sex), never sharing needles, and using condoms the right way every time you have sex. With proper medical care, HIV can be controlled.

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Short Communication

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A Study of Malaria in Goa

Arvind Nath

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Abstract

Background: To the best knowledge of the author, there is no available literature on the status of Malaria in Goa. Hence the preparation of this document.

Objectives: To find out the parameters of Malaria in Goa till as recently as possible.

Methods: By studying the documents prepared by the National Centre for Vector Borne Diseases (NCVBD) and doing a web search on Malaria in Goa.

Results: It is seen that the Annual Parasite Incidence (API) of Malaria in Goa had come down to the very low level of 0.24 in 2018 and that there were only 272 cases of Malaria in Goa during 2019.

Conclusions: Goais very close to achieving near elimination goals but will have to take active measures to reach it.

Keywords: Malaria; Goa; API; NCVBD; WHO.

MATERIAL & METHODS

The study design included analysis of the annual reports of the Malaria Division of the National Centre for Vector Borne Diseases Control (NCVBDC) for 2017 and 2018 and a web search for information on Malaria in Goa.

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RESULTS

According to the most recent data available on the NCVBDC website (data for 2018), the API for Goa was 0.24.[2] It's comparison with the API from 2017 can be seen from the following table:

Table 1: API of Goa, 2017 and 2018

State	Year	
	2017	2018
Goa	0.42	0.24

[Sources:(2) and (3)]

Here, it is seen that the API in 2018 was about half as that as in 2017.

In 2018, the API was not uniform throughout the state but varied between the districts. This can be seen from the following table:

Table 2: API of the Districts of Goa, 2018

S. No.	District	API
1	North Goa	0.30
2	South Goa	0.20

[Source:(2)]

Further search revealed the following information on Malaria cases in Goa during 2019 and 2020 and is shown in the following table:

Table 3: Data on Malaria Cases in Goa, 2019 and 2020

Reference Period	Number of Malaria Cases
2019	272
2020 (till July)	53

[Sources: (4)]

INTRODUCTION

Fig. 1: Map of Goa [***Source:*** (1)]

Goa is in the western part of India. It is bordered by Maharashtra in the north, the Arabian Sea in the west and Karnataka in the east and south.

DISCUSSION

Beginning in 2017, there has been a decline in the incidence of Malaria in Goa.

In 2016, the Government of India adopted a framework for Malaria Elimination in India covering the period 2016 – 2030.[5] This was based on WHO's Global Technical Strategy for Malaria covering the period 2016 – 2030 which was adopted in 2015 and updated in 2021.[6]

The aim is to reach zero Malaria cases by 2027 and then wait for three years before WHO can grant Malaria free status certification. It is already nearly the middle of 2022 and India is about to reach the halfway mark of the period from 2016 to 2027.

CONCLUSION

Although Goa did not reach zero Malaria cases in 2020, it did reach an API of 0.24 during 2018. Therefore, it is a good candidate for being among the first few states in the country close to being able to achieve near elimination goals.

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Conflict of Interest: There is no conflict of interest.

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