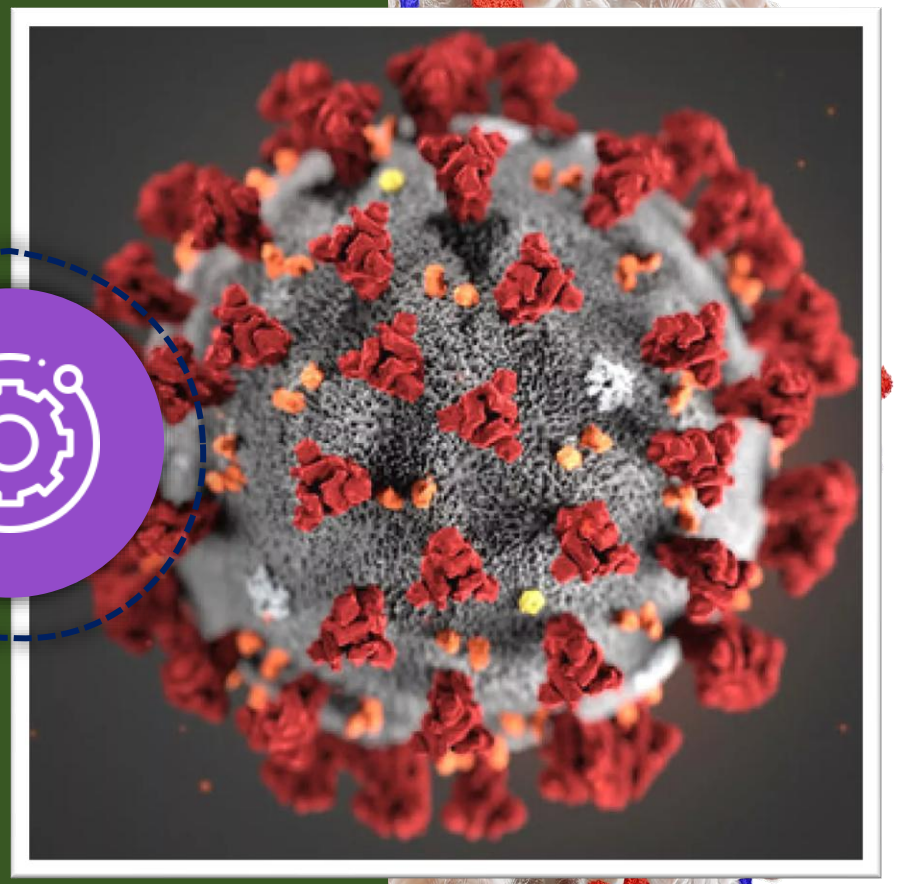
جامعة المستقبل

AL MUSTAQBAL UNIVERSITY

كلية طب الأسنان

Assessment of COVID-19 vaccination coverage among dental students , graduates , and academic staff in Al-Mustaqbal university



Assessment of COVID-19 vaccination coverage among dental students , graduates , and academic staff in Al-Mustaqbal university

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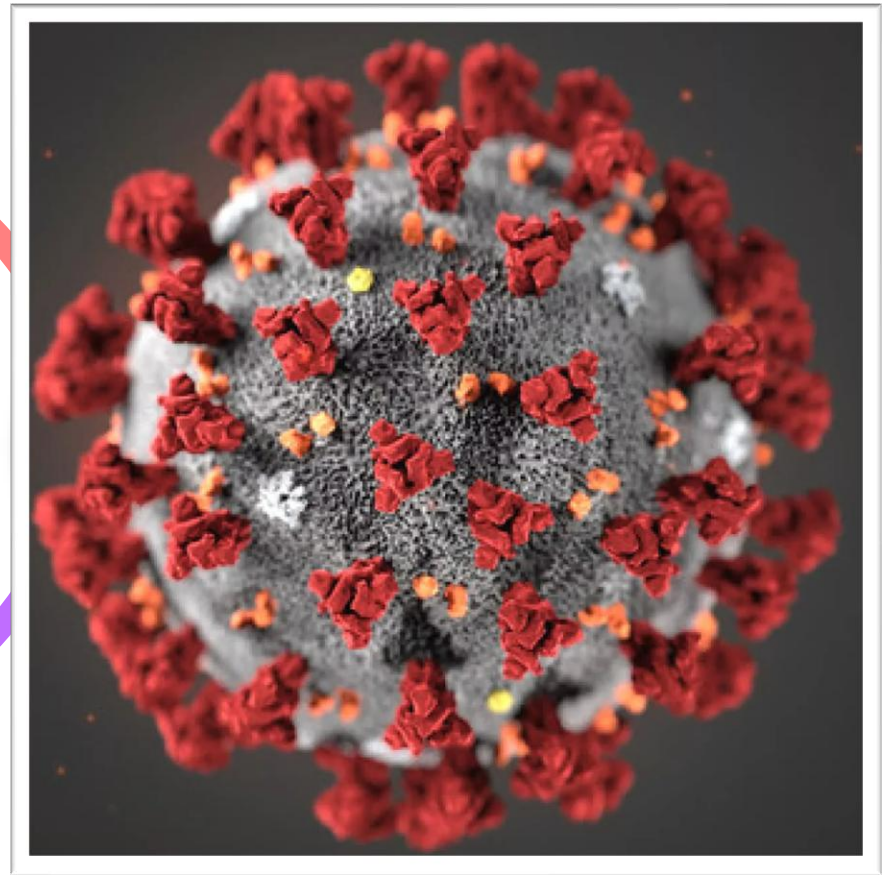


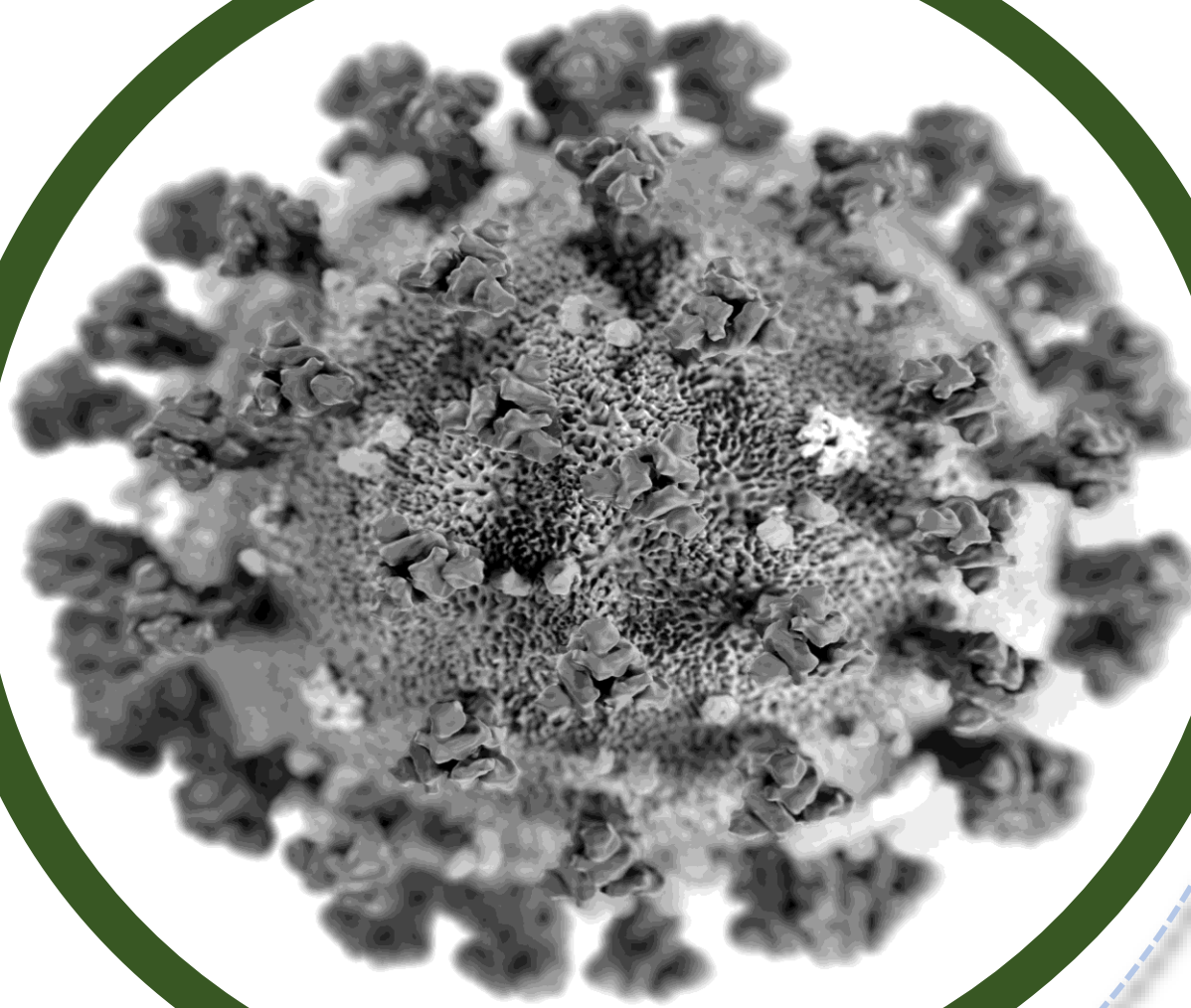
A Research Project

Submitted to the College of Dentistry, Al_Mustaqbal University in Partial Fulfillment of the Requirements for the B.D.S. Degree in Dentistry

Introduction

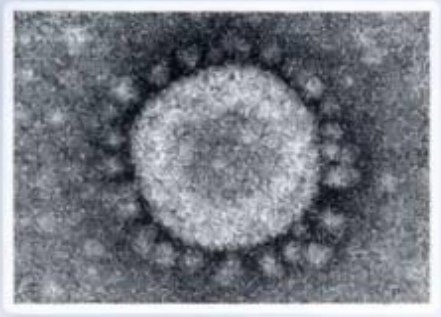
COVID-19

- Emerged in late 2019 in China, caused by SARS-CoV-2.
- An enveloped RNA virus with main structural proteins: S, E, M, N.
- Mutations mainly occur in the Spike protein, affecting transmissibility and immune escape.
- Belongs to the coronavirus family (Alpha, Beta, Gamma, Delta), with origins linked to bats.



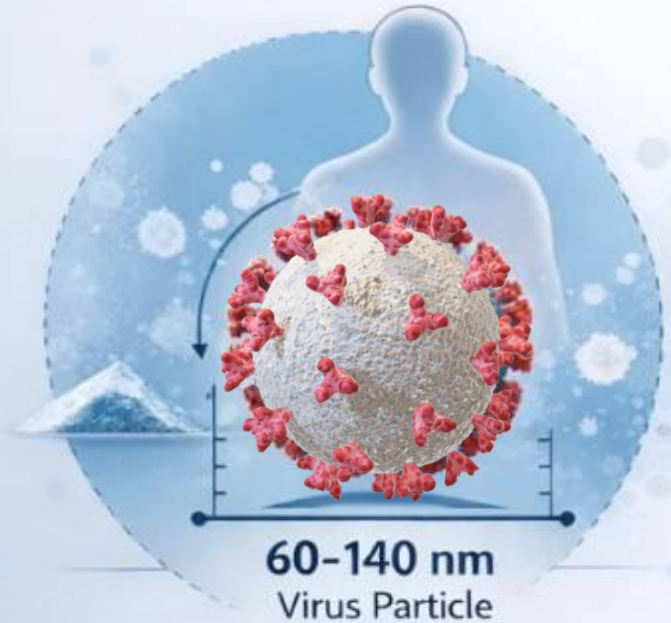
COVID-19 Virus (SARS-CoV-2)

SIZE



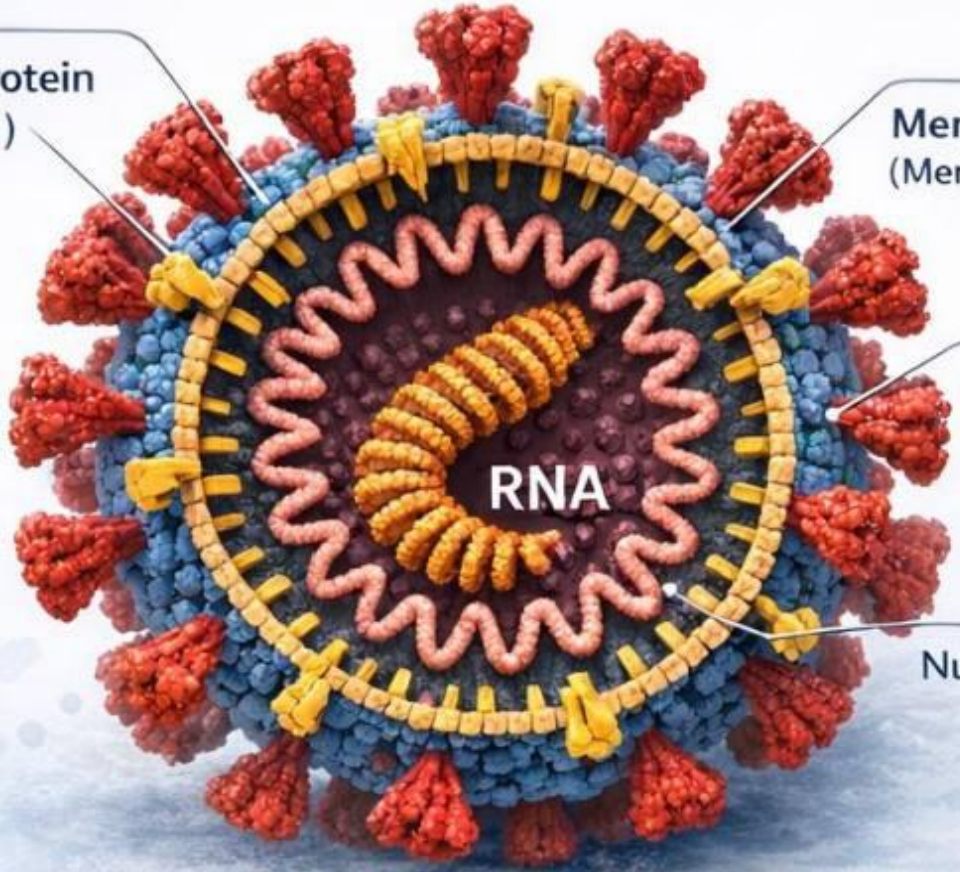
60–140 nm

Smaller than can be seen by electron microscope

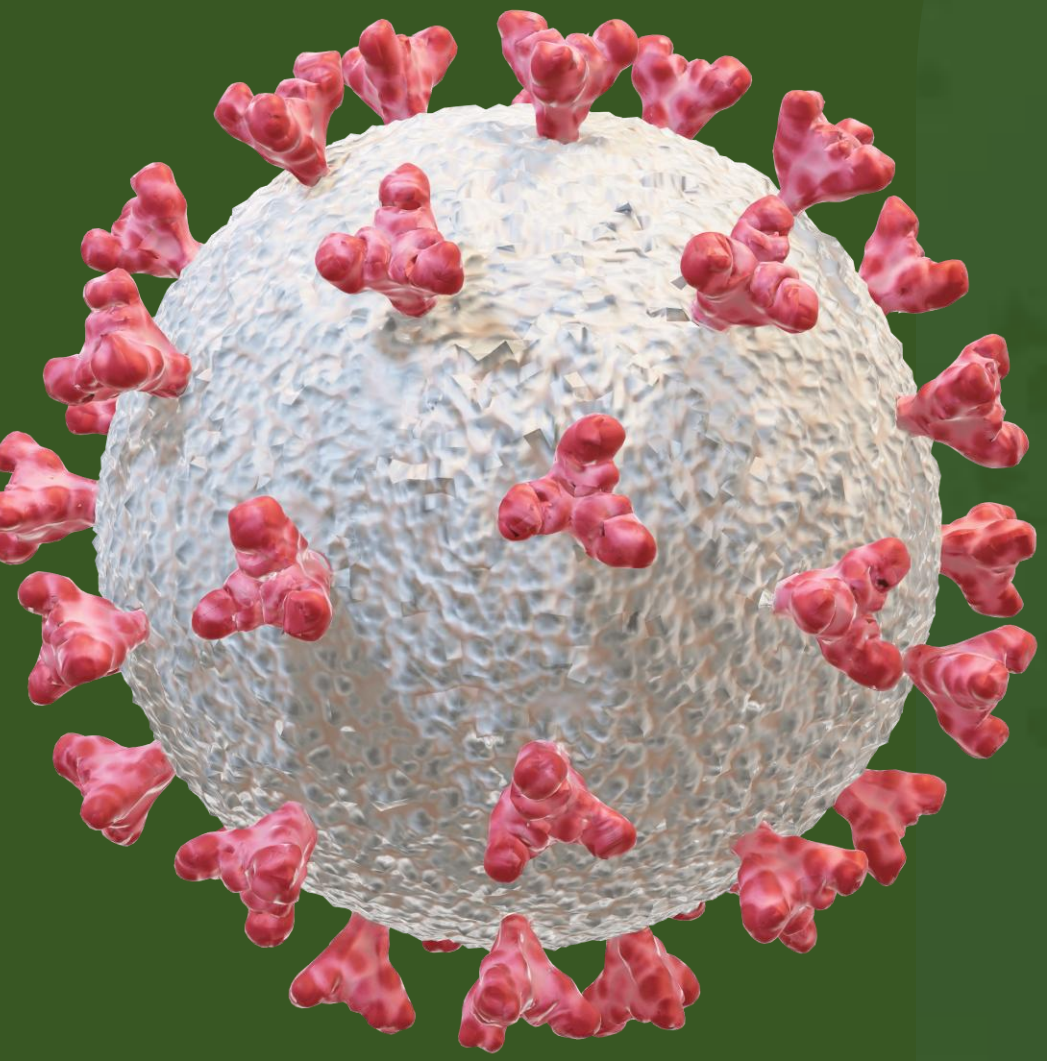


IMPORTANCE

- Causes COVID-19
- Led to global pandemic
- , Affects respiratory and immune system
- Spreads via:



VIRUS COMPONENTS



Major Variants:

- Alpha: More transmissible
- Beta: Immune escape
- Gamma: Reinfection potential
- Delta: Highly transmissible and severe
- Omicron: Very transmissible, generally milder
- Subvariants (e.g., BA.5): Increased immune evasion

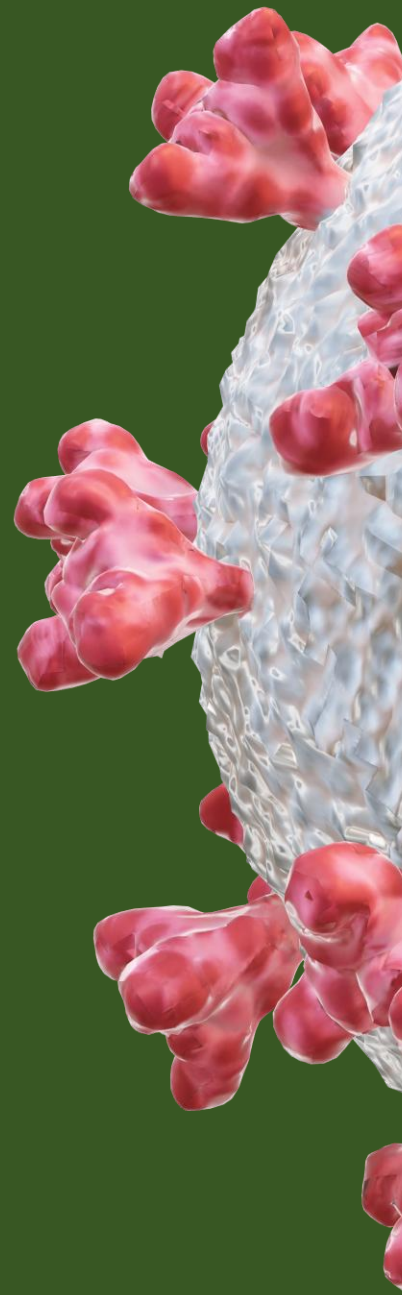
Medical Importance:

- Variants affected disease severity and spread
- Required vaccine updates and continuous monitoring

Complications:

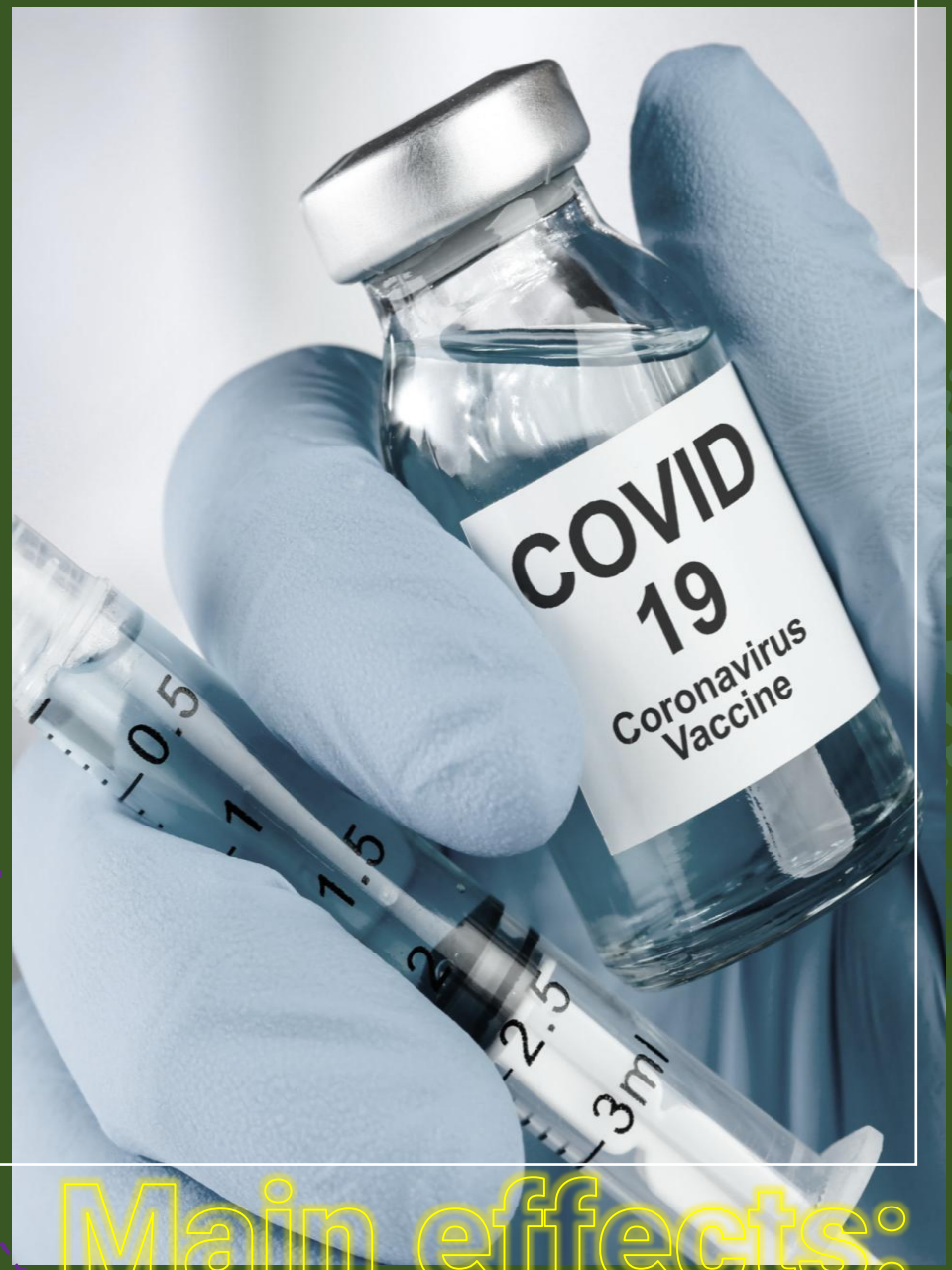
Affects multiple organs due to:

- Cytokine storm
- Vascular damage



Main effects:

- Cardiovascular: Myocarditis, arrhythmias, thrombosis
- Respiratory: Pneumonia, ARDS
- Neurological: Stroke, loss of smell, brain fog
- Renal: Acute kidney injury
- Other: Autoimmune conditions, inflammatory syndromes
- Chronic fatigue (Long COVID)
- Gastrointestinal symptoms



Diagnosis

Main methods:

- RT-PCR (gold standard)
- Antigen tests (rapid, less sensitive)
- Serology tests (past infection)

False negatives may occur (~10%)

Modern Diagnostic Methods:

- Rapid PCR
- LAMP (isothermal amplification)
- Multiplex PCR panels
- Whole Genome Sequencing (WGS)

Blood Tests:

CBC:

- Lymphopenia
- Neutrophilia

Inflammatory markers:

- CRP
- Ferritin
- IL-6

Coagulation:

- D-dimer

Other:

- LDH
- Liver enzymes

COVID-19 emerged in late 2019 and quickly became a global pandemic.

- Dentistry is considered a high-risk profession due to close face-to-face contact and aerosol-generating procedures.
- Many dentists reduced or suspended clinical work early in the pandemic despite strict infection control measures.

Transmission in Dental Settings:

- Droplet transmission: Large particles from coughing, sneezing, or talking (short distance).
- Aerosol transmission: Small particles that remain airborne for longer periods, often produced by dental instruments.
- Direct contact: Virus present in saliva and blood, transmitted through splashes or contact.
- Indirect contact: Contaminated surfaces may carry the virus for up to 72 hours.
- Cross-infection: Between patients and healthcare workers, especially from asymptomatic cases.

Preventive Measures:

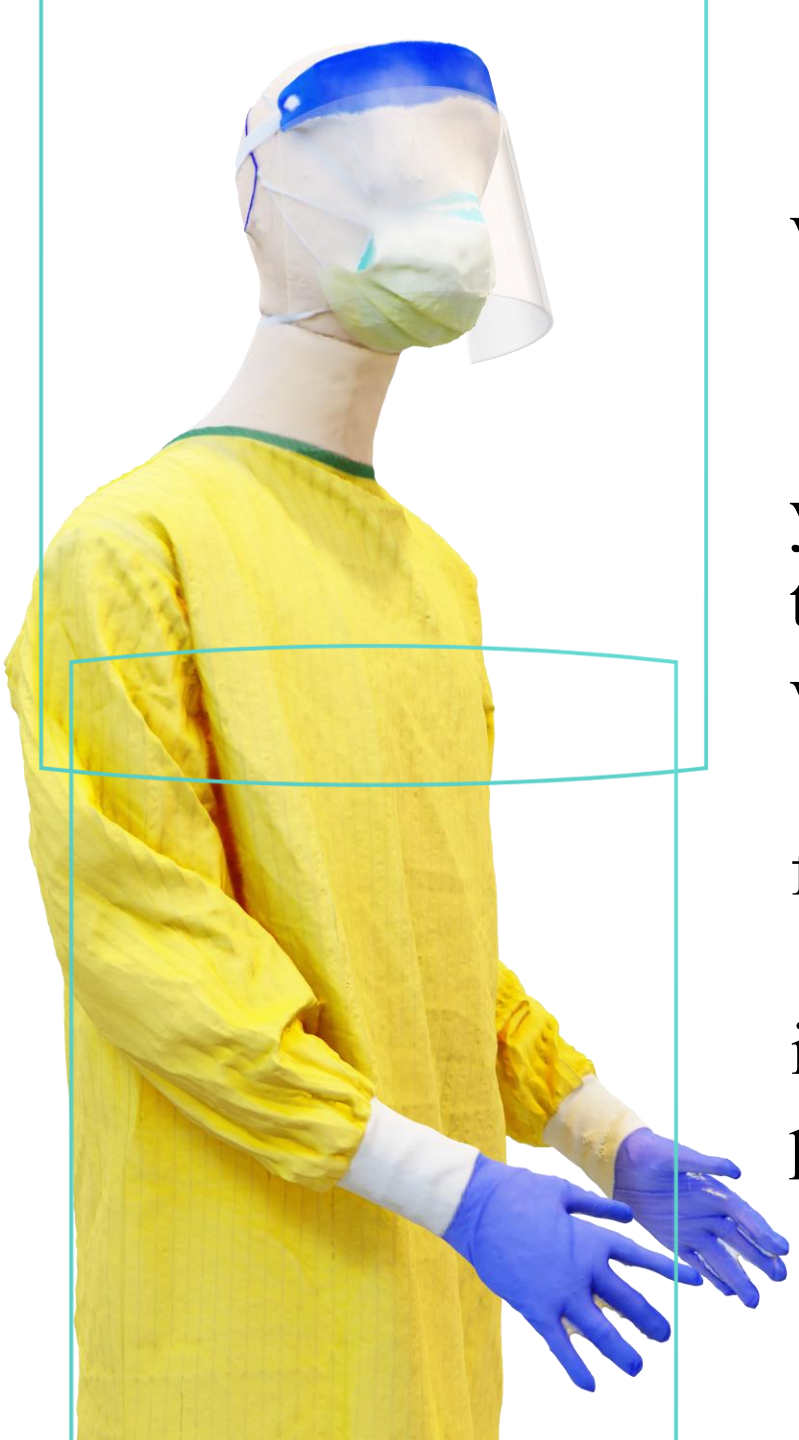
- Use of N95 respirators and face shields.
- Improved ventilation systems.
- Patient pre-screening.
- Use of teledentistry.

Impact on Dental Professionals:

- Psychological stress due to infection risk.
- Financial difficulties .

Global Impact:

- Economic disruption (reduced production, unemployment, inflation).
- Shift toward remote work.
- Global case fatality rate ≈ 0.6%.



Vaccines:

- Developed within one year using advanced technologies (mRNA, viral vectors).
- Effectiveness ranges from 62% to 95%.
- Aim to stimulate immune response and protect against infection.

Types of Vaccines:

mRNA vaccines: Highly effective but require ultra-cold storage.
Viral vector vaccines: Safe but may be influenced by prior immunity.
Subunit vaccines: Safe but may require booster doses.
Inactivated vaccines: Traditional and safe but less immunogenic.
Live attenuated vaccines: Provide strong immunity and are still under development.

Aim of the Study:

To assess COVID-19 vaccination coverage among dental staff at Al-Mustaqbal University, identify factors influencing vaccine uptake, and evaluate awareness and compliance with vaccination guidelines.

Objectives:

Standardize documentation of vaccination data, including types and doses.

Analyze demographic and professional characteristics of staff.

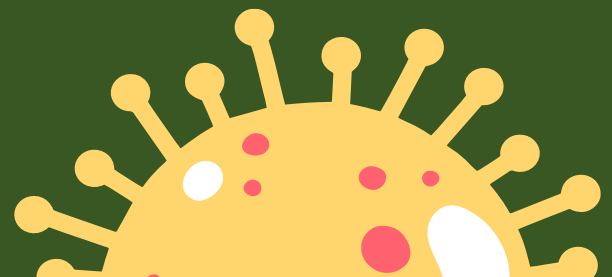
Subjects & Methods

Study Design

- Cross-sectional study
- Conducted at College of Dentistry and Technicians
- Al-Mustaqbal University, Iraq

Participants

- Total: 150 participants
- Academic staff
- Undergraduate students
- Dental technicians



Group

Group A: Older, early-vaccinated cohort representing the Academic Staff , n=21

Group B: Transitional cohort - 4th/Sth Stage Dentistry, n=48

Group C: Younger, late-vaccinated cohort, 2nd/3rd Stage Dentistry

Students= 50

Group D: Dental Prosthetics, n=40

Data Collection

- Structured questionnaire
- Verified by vaccination cards
- Variables:
- Age & gender
- Academic stage
- Vaccine type
- Number of doses
- Last dose date

Statistical Analysis

- Software: Python (Pandas, SciPy)
- Descriptive statistics
- Chi-square test (χ^2)
- Significance level: $p < 0.05$

Results

Table 4-1: Demographic characteristics of the study groups .

Group	Total N	(Age & Gender) Mean Age	Male	Female
Academic Staff	21	42.5 ± 8.1	7 (33.3%)	14 (66.7%)
Students (All Stages)	104	22.1 ± 1.5	45 (43.2%)	59 (56.8%)
Technicians	25	26.4 ± 3.2	2 (8.0%)	23 (92.0%)

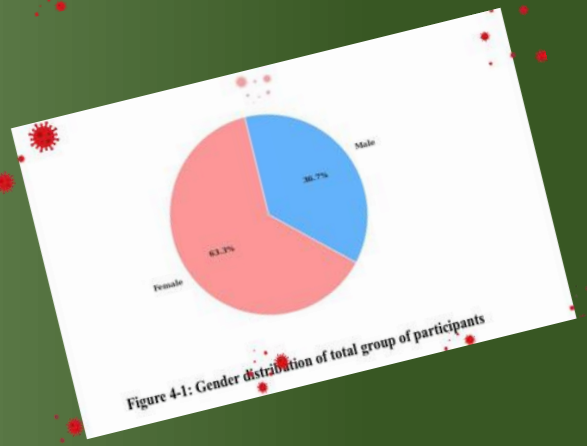


Figure 4-1: Gender distribution of total group of participants

Table 4-2: Association between Academic Stage and Vaccine Brand

Academic Group	AstraZeneca	Pfizer	Sinopharm	Sputnik	Total	χ2 Value	P-Value
Academic Staff	6 (28.6%)	8 (38.1%)	5 (23.8%)	2 (9.5%)	21		
5th Stage	7 (18.4%)	18 (47.4%)	13 (34.2%)	0 (0.0%)	38		
4th Stage	1 (10.0%)	2 (20.0%)	2 (20.0%)	5 (50.0%)	10	85.46	< 0.001*
3rd Stage	6 (40.0%)	6 (40.0%)	0 (0.0%)	3 (20.0%)	15		
2nd Stage	1 (1.5%)	60 (90.9%)	2 (3.0%)	3 (4.5%)	66		
Total	21	94	22	13	150		

Note: Data are presented as n (%). P-value was calculated using Pearson's Chi-square test. (*) indicates statistical significance (P < 0.05).

from Sinopharm/AstraZeneca in older cohorts to Pfizer in younger cohorts.

Table 4-4: Association between Vaccine Brand and Number of Doses

Vaccine Brand	1 Dose	2 Doses	3+ Doses (Booster)	Total	P-Value
Pfizer	2	30	62	94	
AstraZeneca	5	14	2	21	< 0.001*
Sinopharm	1	18	3	22	
Sputnik	2	11	0	13	

Table 4-3 : Time elapsed since the last vaccine dose, highlighting the critical 3-4 year immunity gap.

Time Since Last Dose	Frequency (No.)	Percentage (%)	Cumulative %
1 Year	2	1.30%	1.30%
2 Years	18	12.00%	13.30%
3 Years	95	63.30%	76.60%
4 Years	35	23.40%	100.00%
Total	150	100.00%	

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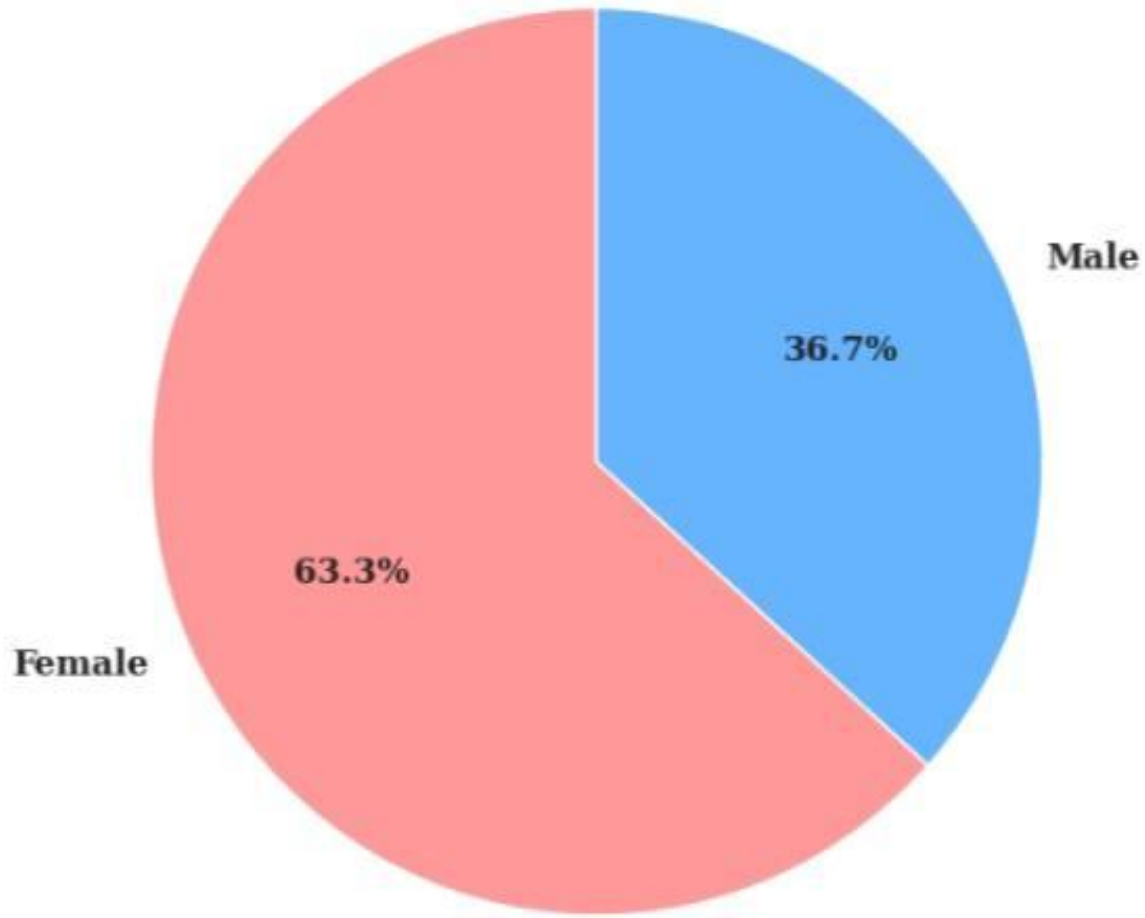

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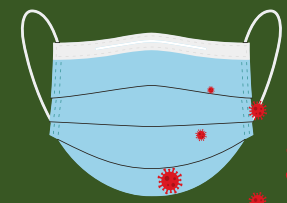

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Conclusion

Different immunity profiles between groups
Hybrid immunity in staff vs. mRNA in students
100% vaccinated creates false sense of security
Immunity declines after about 6 months
Dental clinics are high-risk environments
Senior staff more vulnerable due to age and comorbidities

Recommendations

Adopt up-to-date vaccination policy with recent boosters
Implement targeted booster campaigns for staff and students
Enforce strict PPE use including N95 or FFP2
Improve ventilation with HEPA filters and suction systems
Use digital monitoring and telemedicine for follow-up

Thank You