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Incubation Period in Coronavirus Disease 2019 (COVID-19): A Literature Review

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Abstract
Coronavirus Disease 2019 (COVID-19) is a respiratory illness caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). It is considered to be first reported from Wuhan, Hubei Province, China in December 2019. As of present, there are over 3.7 million identified cases worldwide and more than 259,000 deaths have been reported. This disease, its incubation period, course, complications, and the basis of spread remains a potential question due to variation in the pattern of spread around the globe and relatively fewer number of large-scale studies at present. This literature review aims to study the available data on its spread and incubation period. A literature search using PubMed with regular keywords 'coronavirus' and 'COVID-19', and Medical Subject Headings (MeSH) search for their etiology and pathogenicity was done with the search builder. The literature search revealed 26,689 studies among which 14 studies were selected for review. Studies were selected after the application of inclusion criteria and exclusion criteria with the removal of duplicates, and careful review for the outcome of interest 'incubation period'. Among the 14 studies selected for review, there were eight review articles, five case reports, and one comparative study. The current literature review concludes that the mean incubation period for most of the literature falls between five days to 12 days with minimum reported time from known exposure to the onset of a symptom being one day and the maximum reported time from exposure to the onset of a symptom being 18 days.

Keywords
coronavirus, COVID-19, coronavirus etiology, coronavirus pathogenicity

Introduction

Coronavirus Disease 2019 (COVID-19), a respiratory illness caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) is considered to be first reported from Wuhan, China in December 2019 (1). This infection has taken the face of a global pandemic as of present with over 3.7 million identified cases worldwide and more than 259,000 deaths reported due to its infection or complications (2). With multiple reports and articles published in a relatively short duration, this disease, its complications and the basis of spread remains a potential question due to variation in the pattern of spread around the globe. This literature review aims to study the available data on its spread and incubation period.

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Methods

A literature search using PubMed with both regular and Medical Subjects Headings (MeSH) keywords revealed 26,689 studies. Ninety-one studies were selected after the application of inclusion/exclusion criteria in the following order.

Inclusion Criteria:

1. Articles published on or after Feb1, 2020
2. Human subjects
3. Papers published in the English language
4. Free full text available online
5. Study types included were case reports, review articles, clinical study, case-control study, and randomized control trials.

Exclusion Criteria

1. Exclusive animal studies
2. Literature in languages other than English

Results

Table 1. Number of articles in regular keyword searches. Results are obtained after the application of respective inclusion/exclusion in order from top to bottom of table.

Regular keywords	Number of articles obtained
Coronavirus	
Total records	16385
Inclusion/exclusion	
Published on or after Feb 1, 2020	1701
Humans	455
English language literature	401
Free full text online	184
Study type	36
COVID-19	
Total records	2182
Inclusion/exclusion	
Published on or after Feb 1, 2020	2136
Humans	439
English language literature	387
Free full text online	179
Study type	36

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Table 2. Number of articles in the MeSH keyword searches. Results are obtained after the application of inclusion/exclusion in in order from top to bottom of table.

MeSH Keywords	Number of articles obtained
Coronavirus *Subheading- Etiology*	
Total records	6425
Inclusion/exclusion	
Published on or after Feb 1, 2020	76
Humans	72
English language literature	71
Free full text online	41
Study type	11
Coronavirus *Subheading- Pathogenicity*	
Total records	1697
Inclusion/exclusion	
Published on or after Feb 1, 2020	77
Humans	77
English language literature	69
Free full text online	29
Study type	8

After the removal of duplicates, 36 articles were obtained. Among the 36 selected articles, there were 18 case reports, 16 review articles, one clinical study, and one comparative study. A complete review excluded 22 articles due to the lack of an outcome of interest 'incubation period'.

Finally, a review of 14 publications in PubMed with free full-text available online was done which included:

- Eight review articles (3-10).
- Five case reports (11-15).
- One comparative study (16).

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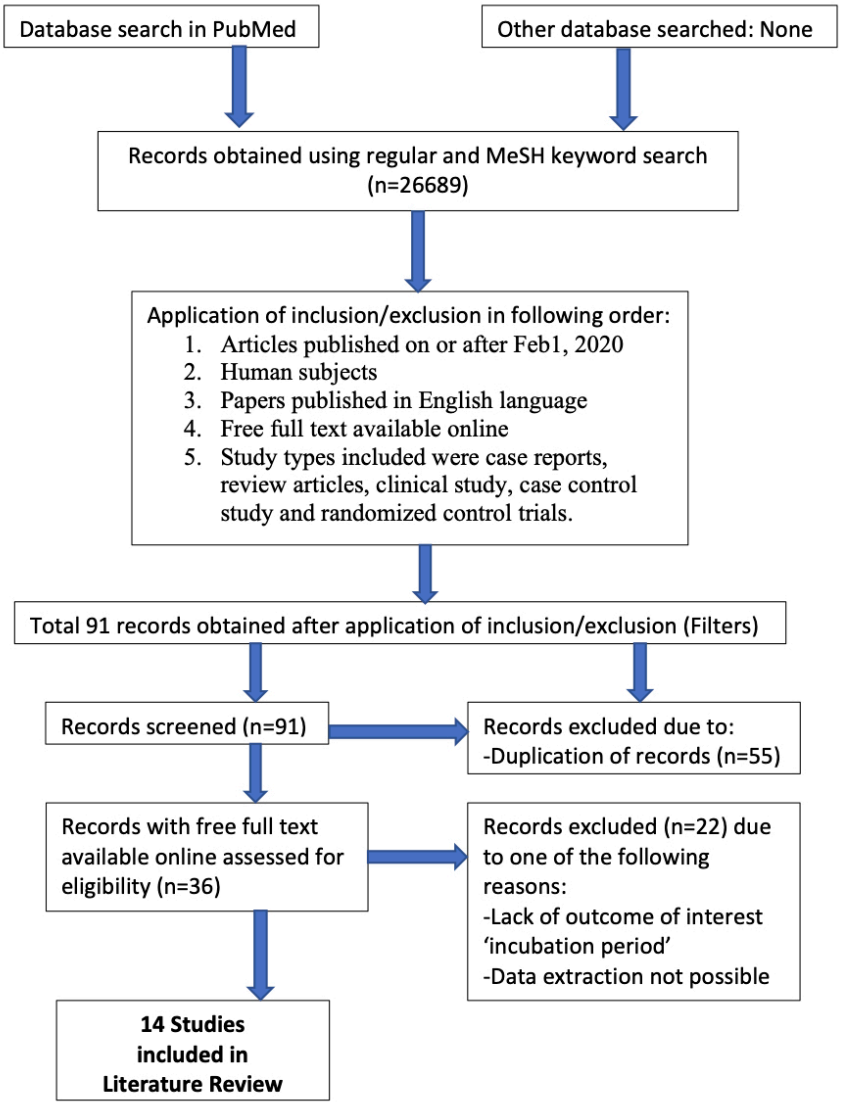
Figure 1. Flow chart depicting the complete process of literature search.



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Discussion

The analysis is aimed to know the reported incubation period of SARS-CoV-2 infection among the 14 reviewed literature. Three of the case reports included in the review reported the time from diagnosis to onset of symptoms that ranged from one day to eight days.

Table 3. Summary of some of the articles with the incubation period reported from the selected data in the literature review.

Author/Date	Study design	Incubation period
Singhal, Mar 2020 (4)	review	range of 2-14 days (median 5days)
Lake, Mar 2020 (5)	review	range of 9.2-18 days (mean 5.2 days)
Okata et al. Feb 2020 (12)	case reports	mean of 6.4 days
Lin et al. Feb 2020 (15)	case reports	generally, 3-7 days (no longer than 14 days)

Due to the difference in the capacity of screening methods among the countries mentioned in the articles and variation in contact tracing, future works of literature still have scope to explore much more regarding the incubation period. Among the reviewed literature, the minimum time from known exposure to onset of symptom was one day and the maximum known time was 18 days. However, most of the articles reported their mean to range between five to 12 days.

Conclusion

The objective of this study is to review the incubation period of COVID-19 infection among recent literature. The current literature review concluded that among the literature reviewed the minimum time from known exposure to onset of symptom was one day and the maximum known time was 18 days with a mean of most of the literature falling between five days to 12 days. However, there remains a broad horizon to explore until the pandemic comes to a complete end with furthermore evaluation.

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