**Face mask compliance and determinants among university students greater Noida Uttar Pradesh India**

**Systematic literature review**

Abstracts

Coronavirus disease 2019 (COVID-19) is a global pandemic that has become one of the main public health concerns worldwide. Because the virus spread quickly through the world, many countries have implemented infection control measures in their efforts to limit the spread of the virus. Face masks are considered to be effective equipment in preventing SARS-CoV-2 spread, especially when social distance cannot be maintained. (1) In a shot to manage and Health groups have recommended wearing a face covering or mask in public situations to avoid the transmission of the new coronavirus illness 2019 (COVID-19). Wearing a mask is one of the simplest ways to prevent the transmission of COVID-19, as it protects healthy people from contracting the disease and prevents infected people from spreading further. In this situation, a mask serves as a shield, preventing respiratory droplets from travelling to neighbouring persons or surfaces, where the virus can survive.(2) . As mask-wearing is an effective public health measure to reduce the transmission of SARS-CoV-2, assessment of mask-wearing compliance among university students will provide the universities and education department the valuable information which can be used to take appropriate measures to strengthen their public health response.

Methods: Systematic literature review and meta-analysis

Results: 1981 studies were retrieved from the search result, 1009 got excluded because the study tittles and abstracts did not address the research questions, 72 articles were assessed for eligibility from which 29 studies were excluded because they had inappropriate study design, Studies not aimed to discuss face mask compliance were excluded, studies aimed at infection control measures and patient adherence, infection control measures at dental were excluded. Studies measuring other preventive measures were not included unless a face mask was also measured. As a result, five studies were included in this research.

Discussion: Among all five studies included in this review, one study Bob O Amodan et.al focused specifically on the degree and factors of adherence to and satisfaction with the covid-19 preventive measures, it was found that only a small percentage of respondents followed all of the recommended preventive measures, with adherence to mask use being particularly low. According to the authors, behaviour change programmes, particularly the usage of masks, should be expanded to improve adherence and satisfaction with preventive measures. Another study Prince Yeboah et.al. When researchers looked into the probable link between illness awareness and preventive measures, they discovered that compliance with preventive measures and willingness to take vaccines were both poor.

Conclusion: The findings of this review contribute to the growing literature supporting the compliance of preventive measures of covid-19 to limit the spread of coronavirus-19 among the population, particularly by targeting university students. There is less literature regarding the compliance of face masks among university students. Assessing the compliance of face masks is critical for effectively mitigating the spread of covid-19. Using AXIS standards, this review discovered that the quality of the examined studies was poor (Appraisal Tool for Cross-sectional Studies).

**Introduction**

Coronavirus disease 2019 (COVID-19) is a global pandemic that has become one of the main public health concerns worldwide. Because the virus spread quickly through the world, many countries have implemented infection control measures in their efforts to limit the spread of the virus. (1). The disease spreads from person to person mainly by respiratory droplets that come into close contact. Hand sanitation, wearing masks, and social distancing are some of the non-pharmaceutical measures recommended in addition to vaccination for reducing the spread of the infection. Wearing a mask is one of the simplest strategies to limit the spread of COVID-19 by protecting healthy people from becoming infected and preventing infected people from transmitting the disease further.(2). The widespread use of masks in the community is known to inhibit the spread of COVID-19 in two ways: it prevents a healthy person from contracting the disease and it prevents an infected person from transmitting the disease, according to studies mask works as a shield in the latter situation, preventing respiratory droplets from spreading to surrounding persons or surfaces, where the virus can survive (3). Mask use is an effective public health intervention for reducing SARS-CoV-2 transmission, assessment of mask-wearing compliance among university students will provide the universities and education department the valuable information which can be used to take appropriate measures to strengthen their public health response (4). A face mask is a loose-fitting mask that covers the nose, mouth, and chin for a single use. Using it is an easy and low-cost way to minimize respiratory illnesses and protect one's own health. Face masks are recommended by health organisations all over the world to reduce the spread of respiratory illnesses. The correct practise and wearing technique are required for the proper use of a face mask. An assessment of these two factors could provide important information for establishing health promotion programmes to improve the efficacy of face mask use. (5) Although the benefits of wearing a mask are well known, there is little or no research and information about the level of mask compliance among university students. The student's willingness to embrace the mandatory face masking practise as a step toward reducing the spread of covid-19 is critical in order to decrease covid-19 mortality rates. (6) Face mask compliance has been linked to a reduction in the rapid spread of covid-19. Face masks are thought to be one of the most important non-pharmacological protective measures for preventing covid-19. It is crucial to practise effective face mask compliance in public settings such as campuses. Wearing masks is an important step in reducing transmission and saving lives. Masks can be used for either protecting healthy people or preventing onward transmission, or both, regardless of the type. (7)

**Keywords**: face mask, covid-19, compliance, and determinants

Figure1.

 **Prisma flow diagram for study search and selection**

Identified records through sech engine PubMed

n:1,981

1,980 studies excluded after limiting search through key words

Articles are not included

n= 55

16 studies were excluded for not meeting with keywords

12 studies not aimed to establish compliance to face masks

8 studies on covid-19 perceived discomfort and knowledge and attitude towards covid-19

2 studies on covid-19 vaccine

3 studies on infection control measures and patient adherence

9 studies were excluded because of non-compliance with research objectives

3 studies were removed not having complete full-text

2 studies were excluded because of non-compliance with research objectives

After duplicate removed

n:72

Articles screened on the basis of abstract

n:72

After careful reading of online abstracts

Full articles excluded

n:12

3studies were excluded because no methodology.

1 study were excluded for not relevant

The number of full-text papers evaluated for suitability

n:17

Studies included

n:5

Methods

**Formulation of primary and secondary research questions**

Based on the main objectives of this study, the primary research question has been framed as “What is the level of compliance to mask among university students? and the secondary research question is “What are the determinant factors that affect compliance with face masks among university students”?

**Search for articles**

Based on the research questions above, the following keywords were formed “face mask, “covid-19”, limiting the search to “compliance” and determinants”. Online search engines (PubMed) were used for screening the existing literature. The articles were selected through using PRISMA model of systematic review. The PRISMA flowchart depicting the systematic search used in this article is illustrated in Diagram 1.1

**Selection of studies to be included in the review**

For consideration in this review, studies identified were screened based on the inclusion criteria. five studies assessing face compliance and determinants were selected. Participants: university-level students, face mask compliance, Studies that have been published in peer-reviewed journals and are available in full text in English. If a study did not fit the criteria, it was eliminated. Studies not aimed to discuss face mask compliance were excluded, studies aimed at infection control measures and patient adherence, infection control measures dental were excluded. Studies measuring other preventive measures were not included unless a face mask was measured.

**Charting of key information.**

Information from the selected studies have been extracted and charted under the headings “Author(s) and year of publication”, “Country of origin”, “Aims and Objectives of the study”, “Study population and sample size”, “Methodology” and “Key findings” as demonstrated in the table1 below.

**Extraction of data**

Microsoft Excel was used to compile all of the papers found by the automated database searches. After the duplicates were removed, studies were evaluated to ensure that they matched the eligibility criteria. To aid in the comparison and synthesis of the studies, key information relevant to the study issue was methodically gathered and collated. The authors, publication date, country of origin, study design and data analysis method, pertinent outcome measures, sample size, demographic data, and findings were only some of the details gathered.

**Table 1: The inclusion/exclusion criteria for study**

|  |  |  |  |
| --- | --- | --- | --- |
| **S. No** | **Criteria**  | **Inclusion**  | **Exclusion**  |
| 1 | Study design  | All types of study design other than review articles | Review study |
| 2 | Study population  | University-level students  | Papulations who are not students and students who are not at the university level |
| 3 | Date  | 2016-2022 | Studies conducted before 2016 |
| 4 | Sex  | Both male and females |  |
| 5 | Language  | English  | Other languages aside from English |
| 6 | Study area  | Studies assessing face mask compliance and determinants among university students  | Studies assessing other preventive measures unless face mask was measured  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **S.n** | **Author(s) name and year and state country** | **Objectives**  | **Study population** | **Methodology**  | **Results**  | **Conclusion**  |
| 1 | Rupak Datta, Keith Glenn, et.al.2021 West Haven, Connecticut | During the coronavirus disease 2019 (COVID-19) pandemic, monitor and enhance face-mask compliance among healthcare staff (HCP). | Healthcare personnel | 685 students and 675 medical and dental residents participated in the mixed-methods study. | COVID-19 and non-COVID-19 units had the same weekly face-mask compliance. The use of a multimodal intervention was linked to an increase in face-mask compliance (= 0.023; P =.002). | Despite a facility-wide mandate for universal masking, HCP compliance with face masks remained low. |
| 2 | Prince Yeboah,1 Dennis Bomansang Daliri,2 et.al.2021 six regions of Ghana | Determine whether there is a link between disease awareness and adherence to preventive actions. | General population  | A cross-sectional study was done using an interview-structured questionnaire. n = 1560 people | In overall, the findings acquired show that Ghanaian communities have a decent understanding of the SARS-CoV-2 infection and the pandemic produced by this virus. Despite this level of understanding, | The study, which included respondents from diverse Ghanaian categories and places, reveals that the general public is well-informed about the SARS-CoV-2 epidemic. There is a poor level of compliance with preventive measures and readiness to take the vaccine.. |
| 3 | Bob O Amodan, Lilian Bulage, ed.al.2020Uganda | Assess the level of adherence to and satisfaction with the COVID-19 preventive measures advised by the government, as well as the factors that influence it. | Not specified | cross-sectional national survey questionnaire n:1726 respondent | Only 495 (29%) of the individuals followed all of the preventive measures. However, several of the specific preventive actions were followed to a high degree. Overall, 96 percent of people practised frequent handwashing, 90 percent practised physical separation, and 86 percent practised cough hygiene, whereas just 33 percent used masks. | All of the recommended preventive actions were followed by just a small percentage of respondents, and mask use was especially low. |
| 4 | Minh Cuong Duong, Hong Trang Nguyen, et.al. 2020Vietnam | Knowledge, attitude, and practise (KAP) about the use of face masks, as well as the relationship between COVID-19 knowledge and KAP. | Students  | A cross-sectional study728 | Education levels (P = 0.02) and COVID-19 knowledge (P 0.001) were found to be statistically related to face mask use attitudes. Gender (P = 0.03), regional distribution (P = 0.04), academic majors (P = 0.02), and COVID-19 knowledge (P = 0.01) were all statistically associated with face mask use. | Vietnamese university students have a high level of KAP when it comes to wearing face masks. Most (89.7%, 653/728) participants had good knowledge, 72.8 percent (530/728) had favourable attitudes, and 76.5 percent (557/728) had good practise scores when it came to face masks. |
| 5  | Véronique Renault, Marie-France Humblet 2, et.al.2020Liege, Belgium | On a university campus, evaluate the actual deployment of five barrier gestures during face-to-face teaching activities. | Staff and students  | Random observational survey n: 526 | The overall weighted score for barrier gesture compliance was 68.2. (between 0 and 100). The compliance rates for the various barrier gestures were 83 percent for "Hand sanitization," 65 percent for "Wearing a mask correctly," 89 percent for "Physical distancing in auditoriums," and 44 percent for "Physical distancing outside auditoriums." | They have been shown to be useful in the management of COVID-19, as the barometer that was developed and the results of this survey allowed for a better risk assessment on campuses and identified the critical points that should be addressed in any future public health communication or education messages. |

 **Table 2: Descriptive analysis of included studies of face mask compliance**

**Result** of **Description of studies**

1981 studies were retrieved from the search result, 1009 got excluded because the study tittles and abstracts did not address the research questions, 72 articles were assessed for eligibility from which 29 studies were excluded because they had inappropriate study design, Studies not aimed to discuss face mask compliance were excluded, studies aimed at infection control measures and patient adherence, infection control measures at dental were excluded. Studies measuring other preventive measures were not included unless a face mask was also measured. As a result, five studies have been included in the research.

The total number of 5 papers were eligible for review. Information of selected studies, one study was conducted in West Haven, Connecticut, one in Ghana, one in Uganda, one study was conducted in Spanish, and one in Belgium. One study focused specifically on the degree of adherence to and satisfaction with the covid-19 preventative measures, as well as the factors that influence it. As well as implying that behaviour change programmes, including the usage of masks, should be stepped up to improve adherence and satisfaction with preventive measures. A population's accurate use of face masks was measured in one study. One study attempted to demonstrate a link between disease awareness and adherence to preventive interventions. One research concentrates on many control measures put in place to prevent the spread of covid-19 on college campuses. During the coronavirus disease 2019 (COVID-19) pandemic, one study attempted to evaluate and improve face-mask compliance among healthcare staff (HCP).

Table 3: Quality assessment

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sn  | Source  | Study design | Sampling technique | Target population | Representative population | Sample size | preventive measures of covid-19 | Only compliance levels of face masks | Total quality score |
| 1  | Rupak Datta et.al. 2021 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 3 |
| 2 | Prince Yeboah et.al. 2021 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 2 |
| 3 | Bob O Amodan et.al. 2020 | 1 | 1 | 0 | o | 1 | 1 | 0 | 2 |
| 4 | Minh Cuong Duong et.al. 2020 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 3 |
| 5 | Veronique Renault et.al. 2020 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 4 |

Quality assessment

Quality assessment of studies using AXIS guidelines (Appraisal Tool for Cross-sectional Studies)

From five studies that were included in this systematic review, 4 were cross- sectional study which, for quality assessment (QA) purpose, the AXIS guidelines were used to evaluate research papers in a structured manner and to determine the study's quality . AXIS tool examines survey articles in terms of their introduction, methodology, result, discussion and conclusion and other (funding and conflict of interest, and consent). The aims or objectives are scored one each in introduction (total 2 scores), similarly, appropriateness of study design, justification of sample size, generalizability of sample frame, representativeness of sample, definition of target population, validity, reliability, non-responders measures, explanation of statistical methods and statistical significance individually merit one score in methodology (total score of 10) Result carries 5 marks which is determined based on clearly

explanation of results, concerns about non-responders, measurements of non-responders, consistency of results and the compliancy with methodology. Furthermore, whether the study’s discussion and conclusion were in accordance with results and whether it mentioned the limitations of the study a total score of 2 was assigned for each respective part. Finally, one score is given if either the funding or conflict of interest was mentioned, besides, one extra one mark was allotted for the consent form for respondents in the stud. In the end, the

The maximum score a study can receive is 21, with 9 being the cut-off for a study to be regarded qualified for this article. The outcomes are shown in the table below.

Table 4: Quality assessment of cross-sectional studies using AXIS guideline

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Author (s) name & year of publications  | Introduction (2) | Methods (10) | Results(5) | Discussion (2) | Others (any funding, source or conflict of interest)(2) | Total (21) | Quality assessment |
| Rupak Datta et.al. 2021 | 2 | 5 | 3 | 1 | 0 | 11 | Medium |
| Prince Yeboah et.al. 2021 | 2 | 4 | 4 | 1 | 1 | 12 | Medium |
| Bob O Amodan et.al. 2020 | 2 | 4 | 3 | 1 | 1 | 11 | Medium |
| Minh Cuong Duong et.al. 2020 | 2 | 5 | 4 | 1 | 0 | 12 | Medium |
| Véronique Renault et.al. 2020 | 2 | 8 | 4 | 1 | 1 | 16 | High  |

*QA: 1-7 low 8-14 medium, and 15to 21 is high (Seo, HJ., Kim, K.U. Quality assessment of systematic reviews or meta-analyses of nursing interventions conducted by Korean reviewers. BMC Med Res Methodol 12, 129 (2012). https://doi.org/10.1186/1471-2288-12-129*

**Result**

**Description of studies**

1981 studies were retrieved from the search result, 1009 got excluded because the study tittles and abstracts did not address the research questions, 72 articles were assessed for eligibility from which 67 studies were excluded because they had inappropriate study design, Studies not aimed to discuss face mask compliance were excluded, studies aimed at infection control measures and patient adherence, infection control measures at dental were excluded. Studies measuring other preventive measures were not included unless a face mask was also measured. As a result, five studies were included in research.

In total, 5 papers were eligible for review. Information of selected studies, one study was conducted in West Haven, Connecticut, one in Ghana, one in Uganda, one study was conducted in Vietnam, and one in Belgium. One study focused specifically on the degree of adherence to and satisfaction with the covid-19 preventative measures, as well as the factors that influence it. As well as implying that behaviour modification programmes, particularly the use of masks, should be enhanced in order to improve adherence and satisfaction with preventive measures. Another study measured the correct use of face masks by the population. Prince Yeboah et.al. The goal of the study was to see if there was a link between disease awareness and adherence to preventive measures. The second study focused on different control mechanisms put in place to prevent the spread of covid-19 on college campuses. During the coronavirus disease 2019 (COVID-19) pandemic, the final study attempted to evaluate and improve face-mask compliance among healthcare staff (HCP).

Figure 1.

Figure 2.

Discussion

Among all five studies included in this review, one study Bob O Amodan et.al focused Low proportions of respondents responded to all of the recommended preventive measures, and adherence to mask use was especially low, according to the degree and determinants of adherence to and satisfaction with the covid-19 preventive measures. According to the authors, behaviour modification programmes should be sped up to promote commitment and comfort with preventive measures, particularly the usage of masks. Some other study, conducted by Prince Yeboah et al., looked at the probable link between illness knowledge and preventive measures, and found that compliance with preventive measures and willingness to take vaccines was poor. AXIS guidelines were used to evaluate the quality of the review studies (Appraisal Tool for Cross-sectional Studies). The quality of these studies was considered to be poor in this review. With the exception of one study, which received a high-quality score, the majority of the studies received a medium rating. (8). Although the benefits of wearing a mask are well established, there is little or no research and information about how well university students adhere to face masks. Face mask compliance is linked to a reduction in the rapid spread of covid-19, and face masks are seen to be one of the most important non-pharmacological preventive methods for covid-19 prevention. It is crucial to practise effective face mask compliance in public settings such as campuses. Wearing masks is an important step in reducing transmission and saving people's lives. Masks can be used to safeguard healthy individuals, restrict further transmission, or both, regardless of the type. (9). Despite the importance of wearing a face mask and other preventive measures, little research has been done on them. This study discovered that after performing a quality assessment using the AXIS guidelines (Appraisal Tool for Cross-sectional Studies), even studies reporting on preventive measures have poor quality and need to be improved in order to succeed in efforts to limit covid-19 table 4. The student's willingness to embrace the mandatory face masking approach as a step in lowering the spread of covid-19 is critical in limiting covid-19 fatality rates.(10). Encourage people to take preventive measures is one of the techniques being tried to stop the spread of COVID-19 infection. One of the most significant techniques is to wear masks in public locations such as campuses. One of the most essential methods for slowing the spread of COVID-19 infection is efficient compliance with face masks in public areas, such as campuses. (11)

Limitation of study

There is limited research on university students' compliance with face masks.

Using AXIS standards, this research discovered that the quality of the included reviewed studies was not adequate (Appraisal Tool for Cross-sectional Studies). Only one study was of good quality as a consequence.

Conclusion

The findings of this research add to the expanding body of evidence supporting the use of covid-19 preventative strategies to reduce the spread of coronavirus-19 in the population, particularly among university students. There is limited research on university students' compliance with face masks. Assessing the compliance of face masks is critical for manner in order to maintain the spread of covid-19.

Recommendation

Despite the importance of these precautionary measures in limiting the spread of covid-19, this study found that compliance with preventive measures, particularly face mask compliance, was low. This study also discovered that, after doing a quality evaluation using the AXIS guidelines (Appraisal Tool for Cross-sectional Studies), even studies reporting on preventive measures have poor quality and need to be improved in order to succeed in attempts to diminish covid-19. It is critical that more research should be carried on face mask compliance and other preventive measures; nevertheless, there is less data on face mask compliance, particularly among students. It could have an impact on the fight against covid-19 and add to the public health burden of chronic disorders. In order to control and prevent the spread of the novel coronavirus illness 2019 (COVID-19), as well as to bolster efforts to limit COVID-19. There is a pressing need to look into Covid-19 compliance, as well as other preventive measures, and to improve strategic effective communication. (12).

References

1. Cucinotta V. WHO Declares COVID-19 a Pandemic.

2. K Chu AADSYS. Physical distancing, face masks, and eye protection to prevent person-to-person transmission of SARS-CoV-2 and COVID-19: a systematic review and meta-analysis.

3. MacIntyre CR, Chughtai AA. A rapid systematic review of the efficacy of face masks and respirators against coronaviruses and other respiratory transmissible viruses for the community, healthcare workers and sick patients. International Journal of Nursing Studies. 2020 Aug;108:103629.

4. Cazzaniga S, Pezzolo E, Colombo P, Naldi L. Face mask use in the community and cutaneous reactions to them during the COVID-19 pandemic: results of a national survey in Italy.

5. Mask Wearing and Control of SARS-CoV-2 Transmission in the United States - PMC.

6. Liebst LS, Ejbye-Ernst P, de Bruin M, Thomas J, Lindegaard MR. No evidence that mask-wearing in public places elicits risk compensation behavior during the COVID-19 pandemic. Scientific Reports. 2022 Dec 27;12(1):1511.

7. Renault V, Humblet MF, Parisi G, Donneau AF, Bureau F, Gillet L, et al. The first random observational survey of barrier gestures against covid-19. International Journal of Environmental Research and Public Health. 2021 Oct 1;18(19).

8. Seo HJ, Kim KU. Quality assessment of systematic reviews or meta-analyses of nursing interventions conducted by Korean reviewers. BMC Medical Research Methodology. 2012 Dec 28;12(1):129.

9. Gupta P, Sharma V, Varma S. A novel algorithm for mask detection and recognizing actions of human. Expert Systems with Applications. 2022 Jul;198:116823.

10. Yeboah P, Daliri DB, Abdin AY, Appiah-Brempong E, Pitsch W, Panyin AB, et al. Knowledge into the Practice against COVID-19: A Cross-Sectional Study from Ghana. International Journal of Environmental Research and Public Health. 2021 Dec 7;18(24):12902.

11. Aydemir E, Yalcinkaya MA, Barua PD, Baygin M, Faust O, Dogan S, et al. Hybrid Deep Feature Generation for Appropriate Face Mask Use Detection. International Journal of Environmental Research and Public Health. 2022 Feb 9;19(4):1939.

12. Husain A, Akinola A, Akhtar SM. A case study: emerging role of telehealth and local health practitioners during COVID-19 pandemic. International Journal Of Community Medicine And Public Health. 2021 Apr 27;8(5):2537.