

## Improving the knowledge of the HIV/AIDS community in Surabaya city for self-detection of HIV oral manifestations

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### Abstract

**Introduction:** Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome (HIV/AIDS) remains a significant problem in Indonesia. As individuals with compromised immune systems, PLWHA are susceptible to various opportunistic infectious diseases. Awareness and specific knowledge regarding these conditions are important in facilitating prompt treatment and reduce further morbidity and complication in PLWHA. However, many PLWHA lack essential information about these conditions, describing the importance of designing and education an intervention strategy to increase PLWHA knowledge regarding the oral manifestations of HIV/AIDS. The purpose of this study is to analyze the knowledge of PLWHA about the oral manifestations of HIV/AIDS after virtual learning (V.L) intervention.

**Methods:** A pre- and post-test study was conducted with 30 members of the Mahameru Foundation, a support group for PLWHA in Surabaya. The subjects participated in interactive sessions covering various manifestations of HIV/AIDS, disease etiology, attitudes towards proper treatment, and techniques for self-check screenings.

**Results:** The subjects demonstrated increased knowledge of HIV/AIDS oral manifestations and improved skills in self-detecting oral abnormalities related to HIV/AIDS.

**Conclusion:** Educational interventions through interactive sessions and self-check screenings can enhance PLWHA's knowledge and awareness of oral health, aiding in preventing the disease's progression. This approach supports the government's objective of achieving three zeros: zero discrimination, zero AIDS-related deaths, and zero new cases.

**Keywords:** HIV/AIDS; Oral manifestations; Oral diseases; People empowerment; Self-detection

### 1. Introduction

HIV infection and AIDS are global problems presenting significant challenges today. Indonesia also contributes to the increase in the transmission of this infection.<sup>1</sup> According to UNAIDS (Joint United Nations Program on HIV and AIDS), by the end of 2020, the number of people living with HIV will have reached 37.7 million, including 10.2 million without treatment. Additionally, there were 1.5 million new HIV infections and 680,000 deaths related to AIDS.<sup>2</sup> Regarding HIV cases in Indonesia, in 2019, there were 50,282 people living with HIV and 7,036 people living with AIDS.<sup>3</sup> From January to September 2020, new cases of HIV amounted to 32,293, while 25,119 people were using antiretroviral (ARV) treatment.<sup>4</sup>

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Many cases of HIV/AIDS-associated lesions were identified, including oral pseudomembranous candidiasis, atrophic glossitis, chronic hyperplastic candidiasis, hairy leukoplakia, linear gingival erythema, and other less common lesions such as aphthous stomatitis, exfoliative cheilitis, and angular cheilitis.<sup>5,6</sup> Meanwhile, the observed dental problems included dental caries<sup>7</sup>, chronic marginal gingivitis due to calculus deposits<sup>8</sup>, residual roots, and impacted teeth.<sup>9</sup> A previous dental examination survey revealed that most patients had never visited the dentist since being diagnosed with HIV, and others admitted to hiding their HIV status when visiting the dentist.

In the current pandemic conditions, various efforts have been made to break the chain of transmission of coronavirus disease 2019 (COVID-19). One policy implemented by the Indonesian government is the use of online health services, known as telemedicine, through Circular No. H.K.02.01/MENKES/303/2020 concerning the Implementation of Health Services through the Utilization of Information and Communication Technology in Preventing the Spread of COVID-19. Additionally, the Indonesian Medical Council issued Regulation No. 74 of 2020 concerning Clinical Authority and Medical Practice Through Telemedicine during the COVID-19 Pandemic in Indonesia.<sup>10</sup>

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Educative materials can be delivered using many methods, among which interactive sessions have proven effective. Virtual Learning (V.L.) is a supportive tool with multiple functions—information, communication, collaboration, convenience, and freedom of learning—which is beneficial during the pandemic era.<sup>13</sup> V.L. environments and blended learning have become an accepted part of the classroom lexicon in recent years.<sup>14</sup> Moreover, V.L. is an excellent alternative to classical classroom learning because it focuses on the classroom and learning environment, as well as accommodating interactive activities.<sup>15</sup> From the explanation above, this study aims to describe the oral manifestations and problems related to the oral health of patients with HIV/AIDS at the Mahameru Foundation, Surabaya-Indonesia, and assess dentist awareness and willingness to provide holistic management regarding their oral health status.

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## **2. Methods**

### **2.1. Subject participant**

Observational studies were conducted within the HIV/AIDS Mahameru Surabaya Community in Indonesia. A total of thirty people living with HIV/AIDS (PLWHA) participated in this study virtually. The protocol for this study was approved by the Ethical Committee of the Faculty of Dental Medicine, with the registration number 588/HRECC.FODM/XI/2021, on November 9, 2021.

### **2.2. Virtual learning material**

A V.L model was used, where participants were given pre-tested materials, including aspects of understanding and attitudes related to the oral manifestation of HIV/AIDS. Ten oral manifestations of HIV/AIDS were presented with clinical pictures, including acute pseudomembranous candidiasis, oral hairy leukoplakia, linear gingival erythema, herpes zoster, herpes labialis, angular cheilitis, aphthous ulcer, necrotizing ulcerative periodontitis, oral warts, and Kaposi's sarcoma. Each oral manifestation was accompanied by three identical questions presented in Table 1, and then scored as a pre-test point.

### **2.3. Evaluation material**

The educational materials contained information about ten oral manifestations of HIV/AIDS, including the causes of the disease, and attitudes towards proper treatment. The various manifestations also show the clinical pictures of each.

After being given the educational materials, participants will be given a post-test to determine the increase in understanding and attitudes related to the oral manifestations of HIV/AIDS, similar to the pre-test.

**Table 1** The question to assess the oral manifestations of HIV/AIDS

| The question related oral manifestations of HIV/AIDS                | Answer options   |
|---|--|
| Have you ever experienced this kind of abnormality in your mouth?   | Yes<br>Never<br>I don't know   |
| According to your knowledge, what is the cause of that abnormality? | Fungal<br>Bacteria<br>Allergy<br>Sore throat<br>I don't know   |
| What do you do when you experience this disorder?                   | Ask friends or browse information on the internetask at the pharmacy<br>Check with the doctor or dentist.<br>Treat with herbal, traditional, or alternative medicine<br>Do nothing |

#### 2.4. Statistical analysis

This study employs comparative analysis to evaluate the knowledge scores and attitudes of respondents towards the treatment of HIV oral manifestations, utilizing a non-parametric test (Wilcoxon). The analysis is conducted using GraphPad Prism 9 for Macintosh.

### 3. Results

#### 3.1. Subject characteristic

The majority of the participants were male, comprising 18 individuals, whereas the female participants numbered 12. Additionally, the age range of the subjects spanned from 25 to 55 years, as detailed in Table 2.

**Table 2** Demographic Characteristics and the HIV/AIDS status of the respondents

| Characteristics             | Number | %  |
|-----------------------------|--------|----|
| Demographic Characteristics |        |    |
| Gender                      |        |    |
| Male                        | 18     | 60 |
| Female                      | 12     | 40 |
| Age (years)                 |        |    |
| 25-30                       | 4      | 13 |
| 31-35                       | 7      | 23 |
| 36-40                       | 6      | 20 |
| 41-45                       | 9      | 30 |
| 46-50                       | 2      | 7  |
| 51-55                       | 2      | 7  |
| HIV/AIDS Status             |        |    |

| Age of first diagnosis with HIV (years) |    |    |
|---|----|----|
| 20-25                                   | 4  | 13 |
| 26-30                                   | 16 | 53 |
| 31-35                                   | 7  | 23 |
| 36-40                                   | 2  | 7  |
| 41-45                                   | 1  | 3  |
| ARV therapy                             |    |    |
| Yes                                     | 26 | 87 |
| No                                      | 4  | 13 |
| Length of use of ARV (years)            |    |    |
| 1 - 5                                   | 12 | 40 |
| 6 - 10                                  | 8  | 27 |
| 11 - 15                                 | 6  | 20 |

### 3.2. HIV/AIDS status

Table 2 details the age at initial HIV diagnosis. A significant portion, 16 (53%) of respondents, were diagnosed between 26 and 30 years of age. Most of the 26 respondents who consistently used ARV had been on ARV therapy, with a majority having used it for 1-5 years, as shown in Table 3.

A high percentage of respondents, 80% or 24 individuals, reported oral health problems (Table 4). Dental caries and oral ulcers were the most frequent issues, each affecting 23%, while fungal infections were reported by 17% of respondents. Six out of 30 respondents (20%) reported no oral health issues (Table 4).

**Table 3** The oral health complaint among subjects

|                               | Number | %  |
|-------------------------------|--------|----|
| Oral health complaint         |        |    |
| Yes                           | 24     | 80 |
| No                            | 6      | 20 |
| Type of oral health complaint |        |    |
| Dental caries                 | 7      | 23 |
| Impacted teeth                | 1      | 3  |
| Fungal infection              | 5      | 17 |
| Gangrene radix                | 1      | 3  |
| Gum Bleeding                  | 3      | 10 |
| Oral Ulcer                    | 7      | 23 |
| No Complaint                  | 6      | 20 |

On the psychological aspect, 23% of respondents (seven people) experienced challenges in accepting their HIV status. This included 17% who felt stigmatized by society. Around 13% reported receiving different treatment from healthcare professionals following their HIV diagnosis (Table 5).

**Table 4** The hardest thing about being diagnosed with HIV

| The hardest thing about being diagnosed with HIV         | Number | %  |
|--|--------|----|
| Status acceptance  | 7      | 23 |
| Transmission to offspring                                | 1      | 3  |
| ARV side effect  | 2      | 7  |
| Discrimination from health providers                     | 4      | 13 |
| Depression   | 2      | 7  |
| Being sick   | 1      | 3  |
| Negative Stigma & social discrimination from the society | 5      | 17 |
| Fear of death  | 2      | 7  |
| There is no cure yet                                     | 1      | 3  |
| Nothing  | 5      | 17 |

### 3.3. Knowledge about oral lesion-related HIV/AIDS

Their knowledge about the oral manifestation of HIV-related lesions significantly changed before and after the V.L. intervention, especially regarding the closely related lesion of HIV infection, candidiasis (Table 6). Before the V.L., only two people answered correctly, but after the V.L, 21 people were able to correctly identify the lesion (Table 7).

**Table 5** The subject's level of knowledge about the oral manifestations of HIV/AIDS that they have experienced

| Diagnosis                            | Yes          |               | No           |               | Didn't Know (%) | True Answer |      |           |      | Improving knowledge (%) | P-value  |
|--------------------------------------|--------------|---------------|--------------|---------------|-----------------|-------------|------|-----------|------|-------------------------|----------|
|                                      | Pre-test (%) | Post-test (%) | Pre-test (%) | Post-test (%) |                 | Pre-test    | (%)  | Post test | (%)  |                         |          |
| Acute Pseudomembranous Candidiasis   | 24.00        | 31.80         | 76.00        | 68.20         | -               | 2           | 6.7  | 21        | 70.0 | 63.0                    | <0.0001* |
| Oral Leukoplakia Hairy               | 36.00        | 18.20         | 64.00        | 81.80         | -               | 2           | 6.7  | 15        | 50.0 | 43.0                    | 0.0010*  |
| Linier Gingival Erythematous         | 28.00        | 9.10          | 68.00        | 90.90         |                 | 6           | 20.0 | 9         | 30.0 | 10.0                    | 0.5078   |
| Herpes Zoster                        | 12.00        | 0             | 76.00        | 100           | 12.00           | 3           | 10.0 | 17        | 56.7 | 47.0                    | 0.0001*  |
| Herpes Labialis                      | 8.00         | 0             | 92.00        | 100           | -               | 12          | 40.0 | 15        | 50.0 | 10.0                    | 0.6875   |
| Angular Cheilitis                    | 92.00        | 0             | 8.00         | 100           | -               | 10          | 33.3 | 11        | 36.7 | 3.0                     | 0.9999   |
| Aphthous Ulcer                       | 40.00        | 36.00         | 60.00        | 64.00         | -               | 11          | 36.7 | 15        | 50.0 | 13.3                    | 0.1250   |
| Necrotizing Ulcerative Periodontitis | 16.00        | 9.10          | 80.00        | 90.90         | 4.00            | 11          | 36.7 | 21        | 70.0 | 33.0                    | 0.0039*  |
| Oral Warts                           | 0            | 0             | 92.00        | 100           | 8.00            | 9           | 30.0 | 15        | 50.0 | 20.0                    | 0.0312*  |
| Kaposi's Sarcoma                     | 8.00         | 0             | 0            | 100           | 4.00            | 11          | 36.7 | 11        | 36.7 | 0                       | 1.000    |

\*Significant difference (pre -test vs post-test)

**Table 7** Subject's attitude towards treatment of oral manifestations of HIV/AIDS

| Category  | Pre-Test |       | Post-Test |      | P-value |
|-----------|----------|-------|-----------|------|---------|
|           | Number   | %     | Number    | %    |         |
| Very Poor | 0        | 0     | 0         | 0    | 0.0039* |
| Poor      | 0        | 0     | 0         | 0    |         |
| Enough    | 2        | 6.7   | 0         | 0    |         |
| Good      | 7        | 23.33 | 1         | 3.33 |         |
| Very Good | 21       | 70    | 29        | 96.7 |         |

Scoring: Very Poor : 0 – 9; Poor : 10 – 19; Enough : 20 – 29; Good : 30 – 39; Very Good : 40- 50; \* : Significant value (< 0.05)

#### 4. Discussion

The benefits of V.L. (Virtual Learning) depend on the involvement of everyone, including course providers, instructors, and learners. Firstly, virtual education enables institutions to expand their reach to students desiring remote access to education. It diversifies teaching methods, enriching the teaching experience. Students greatly appreciate virtual education for its flexibility, cost-effectiveness, and accessibility. Asynchronous courses offer students a more adaptable schedule concerning time and location. V.L. serves as a dynamic option for self-motivated students who can stay focused and track their learning objectives.<sup>16</sup>

AIDS is a global public health challenge and an ARV (antiretroviral) treatable disease caused by HIV. It is characterized by opportunistic infections, secondary malignancies, and significant immunosuppression, leading to neurological symptoms. Besides opportunistic infections, HIV-induced immunodeficiency can also influence the etiology of periodontitis.<sup>17</sup> The benefits of V.L. extend to all involved parties, including course providers, instructors, and learners. V.L. assists institutions in extending their educational reach to students seeking remote learning. It offers a variety of teaching methods, thereby enhancing the learning experience. V.L. is widely valued by students for its flexibility, cost-effectiveness, and ease of access. Asynchronous courses provide a more versatile schedule in terms of time and location. V.L. is an effective alternative for self-directed students who can maintain focus and manage their educational goals.

At least one oral symptom appears as HIV infection progresses.<sup>18</sup> Identifying and treating these oral conditions is crucial for improving the quality of life of PLWHA.<sup>19</sup> Over 13% of respondents report that the most challenging aspect of diagnosing HIV/AIDS involves changes in healthcare professionals' treatment approaches. Research by Verghese et al. (2014) on the knowledge, attitudes, and practices of medical practitioners regarding oral manifestations in HIV patients in Mangalore revealed that while most doctors are aware of AIDS-related information, including transmission and manifestations of HIV, a gap exists between attitudes and actions in addressing oral manifestations.

Thirty-six percent of respondents reported lesions in the form of aphthous ulcers, 31.8% encountered oral candidiasis lesions, 18.20% had cases of oral hairy leukoplakia, and 9.10% experienced periodontitis and linear gingival erythema. This aligns with previous report on oral cavity lesions in HIV patients, where ten consistent lesions are identified: oral candidiasis, oral hairy leukoplakia, herpes simplex virus infection, Kaposi's sarcoma, non-specific ulceration, aphthous ulcers, periodontal disease, salivary gland disease, oral melanotic hyperpigmentation, and oral warts. Genetic and environmental factors, such as poor oral hygiene and malnutrition, play a role in the development of oral ulcers. Oral candidiasis, commonly caused by *Candida albicans*, is the most prevalent HIV-related lesion worldwide. Studies show that pseudomembranous candidiasis is the most common subtype, followed by erythematous, angular cheilitis, and hyperplastic types. Oral hairy leukoplakia, almost exclusively linked to immune deficiencies, indicates patient health.

Oral candidiasis, typically caused by *Candida albicans*, presents in five clinical variants: pseudomembranous, erythematous, nodular or plaque-like, palatal papillary hyperplasia, and *Candida*-contaminated lesions. Pseudomembranous candidiasis, either acute or chronic, is the most common form, characterized by creamy white or whitish-yellow spots or plaques that easily peel off, revealing a raw, reddish, or normal surface. It commonly affects the buccal mucosa, tongue, palate, lips, and gums. Diagnosis is usually clinical, and differential diagnosis includes leukoplakia, hairy leukoplakia, cinnamon contact stomatitis, and other conditions. Systemic triazoles like fluconazole, itraconazole, and ketoconazole are preferred treatments.

Hairy leukoplakia, once a common characteristic lesion of HIV infection, is less prevalent today.<sup>20</sup> It occurs in HIV-infected patients when the CD4 count drops below 500 cells/mm<sup>3</sup> and is caused by the Epstein-Barr virus (EBV).<sup>22</sup> Clinically, it appears as a white, asymptomatic, often non-removable patch, primarily on the lateral edges of the tongue. Treatment is generally unnecessary, but in severe cases, acyclovir, valacyclovir, or famciclovir are effective.

Meanwhile, linear gingival erythema, a rare periodontal disease, frequently occurs post-HIV infection.<sup>23</sup> It presents as a bright red band along the gingival margin, with erythema of the attached gingiva. It does not respond well to traditional plaque control or dental scaling. Differential diagnoses include various forms of gingivitis and candidiasis. Treatment focuses on maintaining high oral hygiene and plaque control.

Shingles is an acute, self-limiting vesicular viral infection that typically affects sensory nerves and, more broadly, individual dermatomes. HIV is the most common predisposing factor for the reactivation of the varicella-zoster virus. The clinical feature characteristic of this disease is the unilateral distribution of lesions. Patients usually experience tenderness and pain in the affected dermatome areas (most commonly the thoracic, lumbosacral, cervical, and trigeminal nerves) as the initial symptoms, followed by fever, headache, and malaise. After 2-4 days, the rash phase continues, marked by the accumulation of vesicles at the base of the erythematous area, which then become pustules and ulcers within a few days, eventually being covered with crusts. Oral manifestations occur when the second and third branches of the trigeminal nerve are affected. The presence of oral cavity lesions is often associated with skin lesions on one side of the face. Differential diagnoses for this disease include herpes simplex, herpangina, erythema multiforme, and chickenpox. Antivirals are the mainstay of treatment, supplemented by pain relief with analgesics and sedatives.<sup>24</sup>

Necrotizing ulcerative gingival inflammation is an acute, painful, inflammatory, and infectious periodontal disease, often occurring in adolescents. HIV infection is a primary predisposing factor for this disease. Clinically, it is characterized by dense inflammation and ulceration with necrotic necrosis, presenting as painful craters on the interdental papilla and the marginal gingiva, covered with a yellowish-grey pseudomembrane. Common symptoms include idiopathic bleeding, bad breath, and excessive salivation. Local lymphadenopathy, low-grade fever, and malaise may also occur. The condition can progress to necrotizing ulcerative periodontitis. Differential diagnoses include primary herpetic gingival stomatitis, desquamative gingival inflammation, granulomatous gingival inflammation, agranulocytosis, neutropenia, acute leukemia, Langerhan's cell histiocytosis, hematopoietic disease, and phytopurulent conditions. Treatment typically involves systemic metronidazole and oxygen-releasing mouthwash, especially in severe cases. Post-acute care includes plaque control, scaling, and root planning.<sup>25</sup>

Kaposi's sarcoma is a malignant tumor originating from endothelial cells, characterized by reasonably good biological behavior and slow growth. The incidence of this disease is high in AIDS patients before ARV therapy. Clinically, oral lesions manifest as single or multiple patches, tumors, or raised plaques, which can ulcerate, showing bright red or brownish-red colors. The palate and gums are the most commonly affected areas, followed by the tongue, cheek lining, and lips.<sup>26</sup>

After learning the V.L. method, respondents' knowledge of HIV/AIDS-related oral lesions has increased. The V.L. methods not only improved understanding, evidence-based practices, and patient care for health providers but also for patients. The benefits of V.L. demonstrate that most participants positively recognize online learning. Initially adopted as a temporary solution for continued education, online learning has had a significant impact, including providing more time for self-study, exposure to new and exciting forms of knowledge, and easy access to creative materials online. However, drawbacks of V.L. include prolonged online time leading to student complaints of fatigue, boredom, and loss of concentration.<sup>28</sup> Another issue is the overheating of electrical equipment after extended online sessions. Students suggest that the optimal duration for an online session should be 100 minutes.

In PLWHA, numerous cases of oral cavity lesions have been observed. These individuals often face challenges in accessing treatment for their oral lesions. Amid the ongoing COVID-19 pandemic, various efforts have been made to ensure that PLWHA can continue receiving information and health services through the V.L. method. In oral medicine, the V.L. approach involves providing education and evaluation, proven to increase knowledge, awareness, and oral health in PLWHA.

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## 5. Conclusion

The V.L. method has not only enhanced understanding, evidence-based practices, and patient care for health providers and patients but also holds promising prospects for future applications, particularly in educating people living with HIV about the early detection of oral lesions related to HIV infection. Looking forward, the continued development of virtual learning platforms could lead to more personalized and interactive educational tools tailored specifically for HIV

patients. These advancements might include the integration of AI-driven simulations and virtual reality experiences, allowing for a more immersive learning environment. This will enable individuals living with HIV to better recognize and understand the signs and symptoms of oral lesions, empowering them with knowledge for early detection and timely intervention. Additionally, future V.L. initiatives could focus on creating adaptive learning modules that cater to different learning styles and literacy levels, thereby enhancing the accessibility and effectiveness of education on this crucial aspect of HIV care. The evolution of V.L. in this context holds the potential to significantly improve health outcomes and quality of life for people living with HIV.

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## Compliance with ethical standards

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## References

- [1] Morineau G, Bollen LJ, Syafitri R, Nurjannah N, Mustikawati D, Magnani R. HIV prevalence and risk behaviours among injecting drug users in six Indonesian cities implications for future HIV prevention programs. *Harm Reduct J* [Internet]. 2012;9(37):1-7. Available from: <http://harmreductionjournal.biomedcentral.com/articles/10.1186/1477-7517-9-37>
- [2] WHO. Global HIV & AIDS statistics. Fact sheet. Unaids. 2020.
- [3] Radithia D, Soebadi B, Hendarti HT, Surboyo MDC, Ayuningtyas NF, Triyono EA. Dental-related problems and oral manifestation of hiv/aids patients in soetomo general hospital surabaya. *Bali Medical Journal*. 2020;9(2):537-41.
- [4] Tobias CR, Fox JE, Walter AW, Lemay CA, Abel SN. Retention of people living with HIV/AIDS in oral health care. *Public Health Reports*. 2012;127(SUPPL.2).
- [5] Berberi A, Aoun G. Oral lesions associated with human immunodeficiency virus in 75 adult patients: a clinical study. *J Korean Assoc Oral Maxillofac Surg*. 2017;43(6).
- [6] Aškinytė D, Matulionytė R, Rimkevičius A. Oral manifestations of HIV disease: A review. *Stomatologija* [Internet]. 2015;17(1):21-8. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/26183854>
- [7] Kalanzi D, Mayanja-Kizza H, Nakanjako D, Sewankambo NK. Extensive dental caries in a HIV positive adult patient on ART; Case report and literature review. *BMC Oral Health*. 2018;18(1).
- [8] Ryder MI, Nittayananta W, Coogan M, Greenspan D, Greenspan JS. Periodontal disease in HIV/AIDS. *Periodontol* 2000. 2012;60(1).
- [9] Zam SNA, Sylvyana M, Sjamsudin E. Management of third molar surgery in HIV-positive patients. *Oral Dis*. 2020;26(S1).
- [10] Amtha R, Gunardi I, Astoeti TE, Roeslan MO. Characteristic of Oral Medicine Patient Using Teledentistry During COVID-19 Pandemic. *ODONTO Dental Journal*. 2021;8(1):18-27.
- [11] Shamsoddin E, DeTora LM, Tovani-Palone MR, Bierer BE. Dental Care in Times of the COVID-19 Pandemic: A Review. *Medical Sciences*. 2021;9(1).
- [12] Suleri JI, Suleri AJ. Comparing Virtual Learning, Classical Classroom Learning and Blended Learning. *European Journal of Sustainable Development Research*. 2018;3(1).

- [13] Huertas A. Teaching and learning logic in a virtual learning environment. *Log J IGPL*. 2007;15(4).
- [14] O'Doherty D, Dromey M, Lougheed J, Hannigan A, Last J, McGrath D. Barriers and solutions to online learning in medical education - An integrative review. Vol. 18, *BMC Medical Education*. 2018.
- [15] Tappuni AR. The global changing pattern of the oral manifestations of HIV. *Oral Dis*. 2020;26(S1).
- [16] Doang THD. The Advantages and Disadvantages of Virtual Learning. *IOSR Journal of Research & Method in Education [Internet]*. 2020;10(3):45–8. Available from: [www.iosrjournals.org](http://www.iosrjournals.org)
- [17] Souza AJ de, Gomes-Filho IS, Silva CAL da, Passos-Soares J de S, Cruz SS da, Trindade SC, et al. Factors associated with dental caries, periodontitis and intra-oral lesions in individuals with HIV / AIDS \*. *AIDS Care - Psychological and Socio-Medical Aspects of AIDS/HIV*. 2018;30(5):578–85.
- [18] Kumar S, Mishra P, Warhekar S, Airen B, Jain D, Godha S. Oral health status and oromucosal lesions in patients living with HIV/AIDS in India: A comparative study. *AIDS Res Treat*. 2014;2014.
- [19] Rovaris NS, Galato D, Schuelter-Trevisol F, da Silva J, da Silva Linhar L, Nickel DA, et al. Oral health status and its impact on the quality of life of children and adolescents living with HIV-1. *BMC Res Notes*. 2014;7(1).
- [20] Greenspan JS, Greenspan D, Webster-Cyriaque J. Hairy leukoplakia; lessons learned: 30-plus years. *Oral Dis*. 2016;22.
- [21] Sumintarti, Ruslin M, Yusuf ASH. Oral hairy leukoplakia manifestations related to CD4 count in HIV/AIDS patients at Dr Wahidin Sudirohusodo Hospital. *International Journal of Applied Pharmaceutics*. 2019;11(Special Issue 4).
- [22] Rosseto JHF, Tenório JR, Mamana AC, Tozetto-Mendoza TR, Andrade NS, Braz-Silva PH, et al. Epstein-Barr virus oral shedding and viremia and their association with oral hairy leukoplakia in HIV+ individuals. *Oral Dis*. 2021;
- [23] Mensana MP, Nugraha AP, Ernawati DS, Soebadi B, Triyono EA, Husada D, et al. Sensitivity and specificity of linear gingival erythema as immune suppression marker in pediatric HIV-infected at UPIPI Soetomo general hospital Surabaya, Indonesia. *Indian J Public Health Res Dev*. 2019;10(2).
- [24] Brahe C, Ellis R. GOT SHINGLES? TEST FOR HIV. Severe shingles as first presenting infection in HIV/AIDS patient. *IDCases*. 2020;19.
- [25] Shangase L, Feller L, Blignaut E. Necrotising ulcerative gingivitis/periodontitis as indicators of HIV-infection. *SADJ*. 2004;59(3).
- [26] Thieringer FM, Cede J, Glatz K, Roehling S, Stoeckle M, Leiggenger CS. Oral Kaposi's Sarcoma: A Case Report and Literature Review on Treatment Management. *Craniofacial Trauma & Reconstruction Open*. 2021;6.
- [27] Koshy M, Mische L, Rizza S, Mahmood M, Bedimo R, Bhatia R, et al. Point-of-care program in HIV, tuberculosis, and associated conditions: A virtual global technical assistance platform to strengthen HIV and tuberculosis workforce capacity. *J Clin Tuberc Other Mycobact Dis*. 2021;23.
- [28] Li N, Wang J, Zhang X, Sherwood R. Investigation of face-to-face class attendance, virtual learning engagement and academic performance in a blended learning environment. *International Journal of Information and Education Technology*. 2021;11(3).