

## Review Article

# Neglected infectious diseases in the geriatrics

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### ABSTRACT

Infectious diseases in the elderly population pose a significant threat to their lives. Neglected tropical diseases significantly impact the health of the affected patients and populations at risk. Reports show that many of these disorders are among the highest ten most typical causes of disability-adjusted life years. In the present literature review, we have discussed the most common neglected tropical infections in geriatrics based on data from the current studies in the literature. Different infections can affect the geriatric population. However, evidence shows that this population is susceptible to developing severe disease-related conditions. This has been reported with dengue infection, onchocerciasis, and cholera. It has been demonstrated that ocular lesions and other clinical manifestations are highest among the elderly population with onchocerciasis. Severe dengue and dengue hemorrhagic fever are also reported at a high rate in this age group. Concurrent infections and disorders were documented with many of these infections, probably due to reduced immunity. Socioeconomic factors, co-morbidities, access to healthcare settings, environmental factors, sanitation, clustering, and overcrowding contribute to the frequency of neglected tropical diseases in the elderly. Further studies are still needed because the current report is scarce, which might underestimate the current evidence.

**Keywords:** Geriatrics, Infection, Neglected clinical characteristics

### INTRODUCTION

Neglected tropical diseases are a particular category under infectious diseases. This category includes different subsets of disorders, owing to different parasitological and

microbiological species.<sup>1</sup> The mechanism of infection of most of these diseases is poorly understood. Besides, the clinical presentation, diagnosis, and management are remarkably different among the relevant investigations. Nevertheless, evidence shows that these conditions are

highly prevalent in the poorest communities globally, being responsible for significant morbidities and high rates of deaths.<sup>2,3</sup>

Neglected tropical diseases significantly impact the health of the affected patients and populations at risk.<sup>4</sup> Geriatric patients are at increased risk of developing these events due to several factors, including poor health status, susceptibility to infections, impaired immunity, and decreased access to healthcare settings. Some neglected infections were reported, most specifically among elderly patients.<sup>5,6</sup> These reports are scarce. Therefore, the impact of these reports might be underutilized. It is essential to conduct comparative investigations to highlight the burden of these conditions. Accordingly, we aim to conduct the current study to discuss the most common neglected tropical infections in the geriatric population, based on reports in the literature.

## METHODS

This literature review is based on an extensive literature search in Medline, Cochrane, and EMBASE databases which was performed on 27<sup>th</sup> November 2021 using the medical subject headings (MeSH) or a combination of all possible related terms, according to the database. To avoid missing potential studies, a further manual search for papers was done through Google Scholar while the reference lists of the initially included papers. Papers discussing neglected infectious diseases in the geriatrics were screened for useful information. No limitations were posed on date, language, age of participants, or publication type.

## DISCUSSION

Different tropical diseases were reported in the literature. These include trachoma, soil-transmitted helminths, schistosomiasis, onchocerciasis, leprosy, leishmaniasis, African human trypanosomiasis, and lymphatic filariasis. Other tropical infections include dracunculiasis, dengue fever, cholera, Chagas disease, and Buruli ulcer. Unfortunately, not many studies in the literature were published to elaborate on the different aspects of neglected tropical diseases in the elderly. Nevertheless, evidence shows that many of the reported infections were significantly associated with disability-adjusted life years, among the ten most common causes of these events.<sup>7-13</sup> However, it should be noted that estimates of these events are not remarkably accurate, and some diseases are underestimated. Furthermore, it has been further demonstrated that most of the reported neglected tropical diseases are focally transmitted. Accordingly, it has been shown that these events' clinical presentations and epidemiological characteristics are significant variants across the different populations. Accordingly, this might indicate that applying practical interventional approaches can significantly enhance the outcomes and eliminate the high prevalence and clusters in the vulnerable groups. Moreover, it is essential to identify the risk factors

predisposed to these disorders' development and high prevalence to apply more adequate interventions.

Some studies reported that dengue is more severe in the elderly population as compared to the younger ones. For example, a previous investigation conducted in Singapore by Rowe et al.<sup>14</sup> included old-age participants ( $\geq 60$  years old) with dengue fever. The authors demonstrated that higher rates of urinary tract infections and pneumonia were noticed among the elderly. This might be attributed to the increased frequency of inserting different medical devices, like urinary catheters and indwelling, in addition to the increased duration of hospital stay. Moreover, this population group also had higher rates of hospital admissions. In the same context, it has been demonstrated that severe dengue and dengue hemorrhagic fever was most frequently reported in the elderly population. However, it should be noted that the authors indicated that there was no association between these worsened clinical outcomes and increased mortality.<sup>14</sup> Previous investigations also indicated the development of similar outcomes in the same population.<sup>15,16</sup> Furthermore, other previous investigations indicated that mortality was significantly correlated with the disease.<sup>15,17,18</sup>

Severe bleeding and severe plasma leakage were the most common manifestations reported in the elderly with severe dengue events. However, related warning signs were less common among this study group. In this context, a previous study by Thein et al demonstrated that severe dengue or dengue hemorrhagic fever was not associated with any of the reported clinical outcomes and complications.<sup>19</sup> On the other hand, specific characteristics included clinical accumulation of fluids, rapid drop in platelet volume associated with hematocrit rise, persistent vomiting, and hepatomegaly.<sup>19</sup> In addition, plasma leakage has been reported to be a characteristic of dengue hemorrhagic fever, while bleeding is more frequently reported in cases with secondary dengue cases.<sup>20</sup> In this context, it has been demonstrated that past infections have been higher among the elderly than younger patients.<sup>21</sup> A previous epidemiological study reported that a history of dengue was prevalent in 88.9% in the included elderly population (55-74 years old) compared to 17.2% in young adults (18-24 years old).<sup>21</sup>

The risk of dengue hemorrhagic fever has been previously associated with having a history of previous dengue infection.<sup>14,17</sup> The presence of co-morbidities might also attribute to the development of severe dengue in this vulnerable population. For instance, diabetes and hypertension were reported to be potential risk factors for developing severe dengue and dengue hemorrhagic fever.<sup>14,22</sup> This was further indicated in a previous study that compared these outcomes with patients without co-morbidities.<sup>22</sup> Diabetes mellitus can significantly impair the immune functions in the affected patients, and therefore, the association might be understood with developing dengue hemorrhagic fever.<sup>23,24</sup> On the other

hand, there is no clear evidence supporting the association between hypertension and severe dengue.

Evidence also indicates that different infections are concomitantly reported among elderly patients with dengue infection. For instance, previous studies reported that *Staphylococcus aureus*, leptospirosis, and malaria are common infections reported in this population group.<sup>25-27</sup> The presence of co-infections has been attributed to the fact that dengue can significantly modulate the immune systems of the affected patients by impairing T-cell proliferation.<sup>28</sup> In the same context, evidence furtherly shows that impaired cytokine response and defects in B and T cell functions are significant features of the elderly population.<sup>23</sup> Leo et al reported that bacteremia was present in 14.3% of the cases that died from dengue.<sup>29</sup> In the same context, another study in Taiwan reported that acute renal failure and prolonged fever (more than five days) were significant predictors of bacteremia in patients with dengue hemorrhagic fever. The authors furtherly demonstrated that concurrent infections were higher among patients with leukocytosis. However, the association was not significant.<sup>30</sup> Another study showed that length of hospital stay and nosocomial infections were higher among elderly patients with dengue with neutrophilia.<sup>14</sup> Therefore, these clinical manifestations and potential complications should be clinically considered for these patients to enhance the diagnosis and management for the elderly and improve the outcomes.<sup>23,31</sup>

A previous study also emphasized the impact of aging on schistosomiasis infections. Based on previous reports from Brazil, the authors demonstrated that the prevalence of schistosomiasis among patients over 60 years of age is high and should no longer be ignored. Furthermore, impairing T-cell functions has been reported to be the primary mechanism by which aging is significantly associated with chronic schistosomiasis.<sup>32</sup> Some reports were also previously published regarding helminths infections, indicating the prevalence of associated blindness with onchocerciasis in the elderly population.

Nwosa conducted a cross-sectional survey in Nigeria and included elderly patients >50 years of age in this context. The authors reported that the prevalence of visual impairment, monocular and bilateral blindness, were 23.7%, 11.9%, and 8.6%, respectively. Cataract was the most commonly reported reason for visual impairment in the studied group. Moreover, it has been demonstrated that other causes of blindness include refractive errors, onchocerciasis, glaucoma, and age-related macular degeneration. These findings indicate the association between onchocerciasis and visual impairment in the elderly population.<sup>33</sup> Many other investigations in the literature also reported various clinical characteristics and ocular manifestations among elderly patients with onchocerciasis. Schwart et al reported that the prevalence of blindness among the elderly population with onchocerciasis was 77.6%.<sup>34</sup> Akogun estimated that only 29.8% of the elderly population were blind, 27.4% had

punctate opacity, and 16.6% had impaired vision.<sup>35</sup> Another case report by Sufi and Tukur also demonstrated that onchocerciasis among the elderly population resulted in 2 cases of blindness.<sup>36</sup> Okoro et al also reported that the prevalence of blindness secondary to onchocerciasis was 28.5%.<sup>37</sup>

A case series by Dozie et al reported six elderly patients with blindness secondary to onchocerciasis.<sup>38</sup> Most of the included studies in the literature included participants  $\geq 50$  years of age. The reported rates for ocular complications are hugely variable across the different investigations in the literature, ranging between 18.2% to 100%.<sup>39</sup> Other manifestations of onchocerciasis in the elderly population were also previously reported in the literature and extensively discussed.<sup>39</sup> Evidence shows that infection to the elderly population by *onchocerca volvulus* significantly leads to impaired host immunity. Therefore, these patients are more susceptible to other conditions and infectious diseases. It has been demonstrated that these events will cumulatively decrease the life expectancy of the affected patients. Other studies also showed that other conditions as epilepsy, HIV infections, and glaucoma are more prevalent among the elderly population affected by onchocerciasis.<sup>40-43</sup> These findings indicate the significant impact of onchocerciasis on the immunity of the affected patients, which remarkably contributes to the development of other comorbid conditions and further deterioration of the cases of the affected geriatric patients.<sup>39</sup>

Reports of cholera infections were also documented in the literature. It has been evidenced that severe complications are more frequent among the elderly population. Evidence shows the association between aging and cholera-induced severe hypotension-related events, like stroke, vomiting-induced aspiration pneumonia, and renal compromise.<sup>44</sup> Other reports also indicated that severe cholera and associated high mortality rates are observed among adult populations. On the other hand, it has been demonstrated that studies conducted in endemic areas demonstrated that such infections more frequently impact younger patients.<sup>45</sup>

Reports based on recent outbreaks of the disease in Yemen indicated that around one-third of the elderly population infected by cholera died, indicating the high virulence of the disease in this population. However, the high rate was attributed to different factors unique to the situation in Yemen. These include the reduced access to healthcare resources and poor quality of care across the country since the war started. Moreover, malnutrition was also prevalent across the country due to the poor resources, contributing to a generalized state of impaired immunity. The high virulence of cholera also strengthens these factors due to the general poor sanitation settings across the country.<sup>46,47</sup> Different risk factors were reported in the literature for neglected tropical diseases. Some of these factors will be discussed in the following section. For instance, different studies have stressed the impact of socio-demographic factors on the development and high prevalence rates of these infections. The reported social factors include

occupation, religion, social class, education, urbanization, and nutrition. In addition, age might also represent a common risk factor for the distribution of the different tropical diseases.<sup>48,49</sup> For instance, it has been demonstrated that blindness secondary to trachoma and onchocerciasis are highly prevalent among the elderly. On the other hand, estimates show that African human trypanosomiasis is highly prevalent among the adult population. At the same time, soil-transmitted helminths, schistosomiasis, and Buruli ulcer are the most typical infections among children. Lymphatic filariasis was also reported to clinically manifest at an old age. However, evidence shows that the infection mainly occurs at a significantly younger age. Environmental factors, housing, and clustering, sanitation, and water were also reported as significant risk factors for the vulnerability of some groups for the development of neglected tropical diseases and infections.<sup>1,50</sup>

## CONCLUSION

Infectious diseases in the elderly population pose a significant threat to their lives. Reports show that many of these disorders are among the highest ten most typical causes of disability-adjusted life years. Different infections can affect the geriatric population. However, evidence shows that this population is susceptible to developing severe disease-related conditions. This has been reported with dengue infection, onchocerciasis, and cholera. It has been demonstrated that ocular lesions and other clinical manifestations are highest among the elderly population with onchocerciasis. Severe dengue and dengue hemorrhagic fever are also reported at a high rate in this age group. Concurrent infections and disorders were documented with many of these infections, probably due to reduced immunity. Socioeconomic factors, the presence of co-morbidities, access to healthcare settings, environmental factors, sanitation, clustering, and overcrowding contribute to the frequency of neglected tropical diseases in the elderly.

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