



CASE REPORT AND LITERATURE REVIEW

Guinea Worm Infection of Human Cases in Gog District of Gambella, South West Ethiopia: 2020 - A Case Report and Literature Review

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Abstract

Background: Dracunculiasis or Guinea worm disease (GWD) was reported consistently as low level transmission, including few infections in animals in Southwest Ethiopia. Despite the aggressive implementation of eradication efforts in Ethiopia, there exist signs of re-emergence. Therefore, this study was aimed to present six GWD of human suspected cases in Gog District of Anywak Zone, Gambella Region, Southwest Ethiopia, 2020.

Case presentation: This study presented 6 suspected human GWD cases with emerging worms among 4 female and 2 male respondents. Of them, four were detected from the Angota side of Duli farm side village and two suspected cases from Metaget Dipach and Wadmaro villages in Gog Dipach Kebele. The Majority were adults above 15-years-old involved in local farming/cattling and the rest students. Of them, three females and two of the males complained the presence of itching and burning sensation. All except two female respondents reported that they know the diseases emerges as a worm and hangs from persons' skin. They had obtained Information from the radio and community volunteers. A large number of house hold members were living together. All of them used to drink unsafe water. They filter or chemically treat the water to prevent guinea worm. Reward provision to the report of GWD was practiced among the public residents along with treatment of pond still recent.

Conclusion: Despite GWD is considered being eradicated, this report points the re-emergence of this parasitic infection alarmingly. Therefore, in spite of the effective measures implemented, a high index of suspicion for early detection and intervention has to be adhered because of the concern. Health professionals, regional and local health offices and

other stakeholders should be aware of this disease, especially in areas where GWD was once prevalent. The government should scale-up provisions of clean and safe drinking water to the public along with treatment of ponds. Community awareness and reward for the report of suspected cases should be continued with cloth monitoring and supervision of the sites.

Abbreviations

GWD: Guinea Worm Disease; WHO: World Health Organization; FMOH: Federal Minister of Health; CDC: Communicable Disease Control; PHEM: Public Health Emergency Management; IDRS: Integrated Diseases Surveillance Response; GRHB: Gambella Regional Health Bureau; EDEP: Ethiopian Dracunculiasis Eradication Programme

Introduction

Dracunculiasis or Guinea worm disease (GWD) is an infection of a large nematode family caused by the parasite *Dracunculus medinensis* [1]. It is an extremely rare neglected tropical disease primarily affecting remote and impoverished communities [2]. It is acquired by drinking water containing copepods (water fleas) infected with *D. medinensis* larvae. The worm typically emerges through the skin with approximately 1 year after infection, resulting in pain, formation of blister and disability [3,4].

Globally, a total of 54 human cases of Guinea worm disease (GWD) were reported to World Health Organization (WHO) with Chad reporting 48 out of the 54 cases

in 2019. Chad is also reporting a high number of animal infections. The other three countries that reported human cases last year were Angola (1 case) and South Sudan (4 cases), and Cameroon (1 case which is likely a spillover from neighboring endemic villages in Chad). Mali, where animal infections are occurring, has not reported any human case since 2016 [5].

Guinea worm disease isn't often deadly, but it can cause serious complications, lifelong disabilities, and financial hardship for those involved. The global study suggests that approximately 129,000 DALYs were attributable to GWD for the entire period 1990-2016 [1,6]. Most cases went unreported for a number of reasons: Most health centers had little to offer patient besides palliative treatment; most patients live in poor, remote rural areas and are hindered by their disease from walking to a health facility; and most recover spontaneously after expulsion of the worm on the other hand it is rarely fatal. It also complicate with other chronic diseases like Diabetes Mellitus [1,6,7]. The global burden of GWD has fallen significantly since the launch of eradication efforts in the 1980s that reduced annual incidence by 99.99 percent, from an estimated 3.5 million human cases in 1986 to 28 human cases in 2018 [5,8]. Annually in 21 countries in Africa and Asia which was Just down slightly from 30 cases reported in 2017. Since 1995, WHO has certified a total of 199 countries, territories and areas, including 187 Member States, as free of GWD free transmission [8,9].

Although GWD remains a challenge in Africa, particularly in Chad, Ethiopia, Mali and South Sudan, trained volunteers are supporting surveillance and detection of infections in domestic dogs and cats. Unfortunately, the recent emergence and persistence of Guinea worm infections in animals have challenged eradication efforts [10]. Surveillance has been heightened, as evidenced by the increase in reports of rumored human cases which in 2019 peaked at 108,207 out of which 106,678 were investigated within 24 hours [11].

After the confirmed Guinea worms report of Carter Center, which had not been seen in the baboons, the community is highly engaged in to water treatment and filtering to dog tethering, a cluster of villages in remote western Ethiopia is applying creative strategies to protect humans and animals from Guinea worm disease, and their diligence is paying off [5]. Due to the aggressive efforts by Ethiopian National Dracunculiasis Eradication Programme (EDEP), Federal Ministry of Health (FMOH), Gambella Regional Health Bureau (GRHB) and other stake holders, no human case was reported since 15 cases in 2017 [5]. Later on, World Health Organization (WHO), reported as Ethiopia has recorded suspected new human cases of GWD in Gambella Region [12]. Likewise, recently, one infected dog and two infected baboons were reported in this settings [5,12]. It portrays that there exists signs of reemergence in this study

setting and the neighboring areas. Therefore, it will help to effectively design and follow intervention programs.

The authors presented the report of six patients with suspected Guinea worm infection found from Dulli farm side village and two other villages namely Metaget Dipach and Wadmaro in Gog Dipach Kebele.

Case Presentation

Case 1

The first case was a 30-years-old female student, was living in Duli village of Gog Woreda of Gambella Region, South West Ethiopia. She complained of itching and burning sensation. She understood that the disease emerges as a worm and hangs from person's skin. She was informed about Guinea worm from the radio and significant others. A total of 8 house hold members were living together. There was another person out of the household member, in this village who complained the above signs. She used to drink unsafe water that was treated by chemicals and it was a means to prevent guinea worm. She heard about the reward of 10,000 and 500 Ethiopian Birr for reporting of Human and Animal Guinea worms during 2018 and 2019. The information was obtained from village volunteer, health workers (Health Extension Workers) and teachers from school. She also observed as a worm emerges and hangs from animal's skin. It was this years that she saw on dog's skin. She observed that the dog ate uncooked fish, frog and other aquatics.

Case 2

The second case was a 22-years-old male involved in local farming, was living in a similar setting. He complained the presence of itching and burning sensation that was reported during March 2020. He was diagnosed while he came to take some treatments for an infected wound. He perceived that the diseases emerges as a worm and hangs from person's skin. He was informed about Guinea worm from the community volunteer. A total of 5 house hold members were living together and there was another person out of the household member too, living in this village. He used to drink unsafe water that was filtered and it was a means to prevent guinea worm. He heard about the reward for reporting of Human and Animal Guinea worms during 2018 and 2019. The information was obtained from village volunteers. He also observed that the worm emerges and hangs from animal's skin. It was this years as he saw on dog's skin. He observed that the dog ate uncooked fish, frog and other aquatics. The ponds were treated recently.

Case 3

An Ethiopian 12-years-old female, who was attending school at the local city and living in a similar setting, knew the diseases emerges as a worm and hangs from person's skin. She was informed about Guinea worm

from the volunteers. They were 5 house hold members living together and one of them ever had the signs of the disease during this year (2019). There was another person out of the household member in this village. She used to drink unsafe water that was filtered which was a means to prevent guinea worm. Similar like the others, she heard about the reward for reporting of Human and Animal Guinea worms during 2018 and 2019. The information was obtained from village chief. But she doesn't observe a worm that emerges and hangs from animal's skin. The ponds were not treated well recently.

Case 4

The fourth case was a 17-years-old female Ethiopian, who was attending school at the local city and living in a similar setting complained the presence of itching, burning sensation and blister formation reported during April 2020. She neither understood that the disease emerges as a worm and hangs from person's skin nor informed about Guinea worm from any one. They were 6 house hold members living together and one of them ever had the disease during this year (2019) and nobody does out of the household. She used to drink unsafe water but it was filtering which was a means to prevent guinea worm. She heard about the reward for reporting of Human and Animal Guinea worms during 2018 and 2019. The information was obtained from village volunteer and supervisors. Similarly, she didn't observe as a worm emerges and hangs from animal's skin. The ponds were not treated well till recently.

Case 5

A 14-years-old female Ethiopian, who was attending grade three at the local city and living in a similar setting, complained the presence of itching, burning sensation had reported on the end of March 2020. She neither get informed that a disease emerges as a worm and hangs from person's skin nor was informed about Guinea worm from any one. They were 4 house hold members living together and one of them ever had the disease during this year (2019) and nobody encountered out of the household. She used to drink unsafe water that was filtered but didn't recognize and understood that was a means to prevent guinea worm. Unlike the others, she didn't know about the reward of reporting of Human GWD but animals. She did not observe a worm on an animal's skin and thought that the ponds were not treated well till recently.

Case 6

The sixth case was a 30-years-old male involved in local farming and living in a similar setting, complained of itching and burning sensation and reported during March 2020. He was recognized while he used antibiotics like Cloxacillin and anti-pain (Paracetamol) along with wound care for the disease. He had a similar perception like most others that the diseases emerges a

worm and hangs from person's skin. He was informed about Guinea worm from the Guinea worm officer and radio. A total of 6 house hold members were living together and one of them ever had the disease during this year (2019). There was another person out of the household member too, living in this village. He used to drink unsafe water that was filtered and it was a means to prevent guinea worm. He heard about the reward for reporting of Human and Animal Guinea worms during 2018 and 2019. The information was obtained from village volunteer; He also observed that a worm emerges and hangs from animal's skin. It was this years that he saw on dog's skin. He thought that the dog ate uncooked fish, frog and other aquatics. The ponds were treated recently.

Discussion and Conclusion

This study presented GWD of suspected human cases with emerging worms among different individuals. It is a debilitating parasitic disease that is limited to remote, rural villages in 13 sub-Saharan African countries that do not have access to safe drinking water [13].

In this study, the cases were detected from the farm side villages in Gog district. These settings were among the endemic areas in Ethiopia [14]. A similar study from Chad has sought that, the peak of first worm emergence occurred during August in both years, corresponding with the rainy season in the southern part of Chad. During the rainy season in Chad when flooding of the Chari River resulted in the formation of many stagnant bodies of water that could have been used as secondary drinking water sources. Because of this abundance, a person had ample choices of water bodies in which to submerge affected body parts as Guinea worms emerged from painful blisters, thereby contaminating the water [15]. Thus studies supported that GWD cases commonly encountered in the rainy, remote and impoverished communities [5,12,16].

Differences in sex and age was portrayed this study. Among them, more than half (four) of them were above the age of 15 years. The incidence of the disease has been found to vary with age and sex in different ways, but these can generally be understood from the way that people of different ages and genders behave with regard to their sources of drinking water [6]. Similar studies of the India and USA has supported this finding [14,17]. A study from Northern Nigeria reported that a significant proportion of the adult Guinea worm male population being disabled during the peak farming season. It is likely that this had an adverse effect on the nutrition and health of their families [18]. Regarding the occupational characteristics, about half of the respondents were involved in local farming/cattling and the rest students. The educational background may inform to the possible exposure of the GWD associated with risky watery grounds during farming and low level of un-

derstanding to the disease and route of transmission of infection [15].

Most of them complained the presence of itching and burning sensation with rare presentation of blister [6,15]. Guinea worm ulcers readily become secondarily infected unless carefully managed and this was the case in this study with many subjects developing a surrounding cellulites. The most frequently isolated bacteria from infected ulcers were *S. aureus* and *hemolytic streptococci*. Tetanus is a well-recognized complication of guinea worm infection after contamination of the wound from soil. No cases of tetanus were observed in this study, although one interviewee reported that his wife had died from an acute febrile illness associated with infection by several guinea worms and it is possible that this was a case of tetanus. About half of the respondents reported that they know the diseases as a worm emerges and hangs from person's skin [18].

Regarding information about Guinea worm, it was obtained from the radio and community volunteers Communication Road Map South Sudan using social and behavior change communication strategies has increased awareness/knowledge in the general population about GWD [19]. A similar setting study has revealed that majority of the respondents have heard about Guinea worm [20,21]. A large number of house hold members were living together and most complained that one of them ever had the signs and symptoms of the disease during the last of 2019 [18-20].

This study confirmed that all of them used to drink unsafe water. These water sources were reported to be associated with the baboon infection in June 2019 in the same village [12]. Similar other studies have reported that drinking water from secondary water (lagoon, ponds, or unprotected dug wells) found associated risk factor with GWD [1,15,16]. Even though access and use of safe drinking water becomes a constraint in rural communities, they either filter or chemically treat the water to prevent guinea worm [1,5,19].

Reward provision to the report of GWD was practiced among the public residents along with the treatment of ponds recently [1,5,16,19,22]. It is a means in which active case searches and surveillance of GWD is promoted to enhance the eradication efforts. A recent review on the future eradication has suggested on elimination of infection in animals, surveillance in settings with insecurity and maintenance of a programmatic infrastructure prior to elimination of transmission. Likewise, critics of eradication programs may claim that the "cost per case" to sustain interventions at this late stage could be better allocated to more pressing public health priorities. Nonetheless, a recent economic analysis shows that eradication is still effective even at this late stage which brought huge benefit in the reduction of human suffering [21,23].

Despite that GWD is considered as being eradicated, this study points signs of re-emergence. Therefore, in spite of the effective measures implemented, a high index of suspicion for early detection and intervention has to be adhered because of the concern. Health professionals, regional and local health offices and other stakeholders should be aware of this disease, especially in areas where GWD was once prevalent. The government should scale-up provisions of clean and safe drinking water to the public along with treatment of ponds. Community awareness and reward for the report of suspected cases should be continued with cloth monitoring and supervision of the sites.

Declarations

Ethical approval and consent to participate

Not applicable.

Consent for publication

Written informed consent was obtained from all participants including parents whose child was under age of 18 years.

Availability of data and materials

The data sets used and/or analyzed during the current study are all included in this study.

Competing interests

The authors declare that they do not have a competing interest.

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Author contributions

Abreha Addis: Involved in the inception, design, data acquisition, analysis, and interpretation, and wrote the manuscript. **Endale Zenebe:** Participated in data acquisition, analysis, and involvement in critical reviewing of the manuscript. Finally, **both** authors read and approved the manuscript.

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References

1. World Health Organization and UNAIDS (2001) WHO recommended strategies for the prevention and control of communicable diseases. WHO, Geneva, Switzerland.
2. Fogoros RN (2020) An overview of guinea worm disease.
3. Hopkins DR, Weiss AJ, Roy SL, Zingeser J, Guagliardo SA (2019) Progress toward global eradication of dracunculiasis

- January 2018-June 2019. MMWR Morb Mortal Wkly Rep 68: 979-984.
4. World Health Organization (2017) Global report on guinea worm. WHO, Geneva, Switzerland.
 5. The Carter Center (2019) Guinea worm wanes to 28 cases globally; Ethiopia, Mali report zero human cases.
 6. Cairncross S, Muller R, Zagaria N (2002) Dracunculiasis (Guinea worm disease) and the eradication initiative. Clin Microbiol Rev 15: 223-246.
 7. Pichakacheri SK (2019) Guinea-worm (*Dracunculus medinensis*) infection presenting as a diabetic foot: A case report from Kerala. Natl Med J India 32: 22-23.
 8. World Health Organization (2020) Updates on dranculosis, epidemiology. WHO, Geneva, Switzerland.
 9. World Health Organization (2020) The Carter Center: Case-statement on the Eradication of Guinea worm Case statement.
 10. World Health Organization (2020) Global dracunculiasis eradication surveillance and control of guinea worm.
 11. World Health Organization (2020) Dracunculiasis eradication: Intensifying surveillance amid continued zero human cases in Ethiopia and Mali. WHO, Geneva, Switzerland.
 12. World Health Organization (2020) Eradicating dracunculiasis: Ethiopia investigates six suspected human cases in Gambella region. WHO, Geneva, Switzerland.
 13. Greenaway C (2004) Dracunculiasis (guinea worm disease). CMAJ 170: 495-500.
 14. Choubisa SL, Verma R, Choubisa L (2010) Dracunculiasis in tribal region of southern Rajasthan, India: A case report. J Parasit Dis 34: 94-96.
 15. Sreenivasan N, Weiss A, Djijatsa JP, Toe F, Djimadoumaji N, et al. (2017) Recurrence of guinea worm disease in Chad after a 10-year absence: Risk factors for human cases identified in 2010-2011. Am J Trop Med Hyg 97: 575-582.
 16. Gebremariam A (2019) Animal guinea worm infection intervention in Gog and Abobo woreda Gambella region, Ethiopia.
 17. Barry SK, Schucany WG (2012) Dracunculiasis of the breast: Radiological manifestations of a rare disease. J Radiol Case Rep 6: 29-33.
 18. World Health Organization (2020) Dracunculiasis (Guinea worm disease) -Ethiopia disease outbreak news.
 19. Yibi MS (2018) Elimination of Guinea worm disease in South Sudan through multi-disciplinary actions. South Sudan Medical Journal, 11.
 20. Cromwell EA, Roy S, Sankara DP, Weiss A, Stanaway J, et al. (2018) Slaying little dragons: The impact of the Guinea Worm Eradication Program on dracunculiasis disability averted from 1990 to 2016. Gates Open Res 2: 30.
 21. Ebead SMS (2016) Knowledge, attitude and practice towards guinea worm among the resident's of Juba County in Central Equatoria State. Texila International Journal of Public Health.
 22. Beyene HB, Bekele A, Shifara A, Ebstie YA, Desalegn Z, et al. (2017) Elimination of guinea worm disease in Ethiopia; Current status of the disease's, eradication strategies and challenges to the end game. Ethiop Med J 55: 15-31.
 23. Greenwood B, Greenwood A, Bradley A (2017) Guinea worm Infection in northern Nigeria: Reflections on a disease approaching eradication. Trop Med Int Health 22: 558-566.