

*Letter to The Editor***Can Bacteriophage Therapy Be an Alternative Solution Against Medicinal Leech Associated Infections?****Mustafa Ünal<sup>1\*</sup>** **Muhammed Emin Göktepe<sup>2</sup>** **Mustafa Yasin Selçuk<sup>1</sup>** **Onur Öztürk<sup>3</sup>**<sup>1</sup> Ondokuz Mayıs University Faculty of Medicine, Department of Family Medicine, Samsun/TURKİYE<sup>2</sup> Giresun Education and Research Hospital Department of Family Medicine, Giresun/TURKİYE<sup>3</sup> Samsun Education and Research Hospital, Department of Family Medicine  
Samsun/TURKİYE**Abstract**

Medicinal leeches are effective in many clinical conditions. But leech associated *Aeromonas* infections are common and limits the benefits of leech therapy. Bacteriophages are specific bacteria hunting viruses that could be used effectively against target bacteria without side effects. There are 5 bacteriophages defined in the literature against *Aeromonas* spp. which their clinical use in hiridotherapy associated infections could open a way for a safer and more effective usage of medicinal leeches.

**Key Words:** Medicinal leeches; hydrotherapy; bacteriophages; *Aeromonas* infections**Öz**

Tıbbi sülükler birçok klinik durumda etkilidir. Ancak sülükle ilişkili *Aeromonas* enfeksiyonları yaygındır ve sülük tedavisinin faydalarını sınırlar. Bakteriyofajlar, hedef bakterilere karşı yan etkileri olmadan etkili bir şekilde kullanılabilen spesifik bakteri avlayan virüslerdir. Literatürde *Aeromonas* spp.'ye karşı tanımlanan 5 bakteriyofaj bulunmaktadır. hiridoterapi ile ilişkili enfeksiyonlarda klinik kullanımları, tıbbi sülüklerin daha güvenli ve daha etkili kullanımının yolunu açabilir.

**Anahtar Kelimeler:** Tıbbi sülükler; hirudoterapi; bakteriyofajlar; *Aeromonas* enfeksiyonlar**Dear Editor,**

Medicinal leeches have been used for various diseases since ancient times (1). They have a numerous valuable protein in their saliva that are beneficial for relieving venous congestion and stimulating wound healing. For these reasons medicinal leeches are being employed for the salvage of flaps and grafts and reimplantation of amputated body parts. It is being reported that they are even useful salvaging the reimplanted body parts where establishing venous anastomosis was not possible (2). Hirudine is the best-known substance in the leech saliva and some hirudine derivatives (lepirudine, bivalirodin and desidurine) are developed for clinical use (3).

Despite the benefits medicinal leech therapy is not risk free and leech associated risks include infections, prolonged bleeding and allergy. Leeches rely on *Aeromonas* species to digest blood as they provide enzymes for protein breakdown. This commensal relationship makes leeches potential vectors for these microbes and eradication them from the leeches' digestive system is very hard. Overall infection risk for leech therapy is reported as %2-20 and %88 of them are caused by *Aeromonas* spp. These infections may cause clinical conditions ranging from simple cellulitis to meningitis. They also severely undermine survival of flaps and reimplanted body parts (4).

Effective control of leech associated infections is very important. First line antibiotics are 3<sup>rd</sup>. generation cephalosporins, fluoroquinolones and trimethoprim-sulfamethoxazoles. Generally, antibiotics are effective but

\*Corresponding author: Dr. Muhammed Emin GÖKTEPE, Ph.D., M.D.

Adress: Giresun Education and Research Hospital Department of Family Medicine, Giresun/TURKİYE

E-mail: drmeg38@gmail.com Received: 04.06.2023 Accepted: 12.07.2023

Cite as: UNAL.M and al. Can Bacteriophage Therapy Be an Alternative Solution Against Medicinal Leech Associated Infections?IJCMBBS 2023;3(3):138-9 doi.org/ 10.5281/zenodo.8150153

emergence of multi drug resistance strains are reported. Furthermore, antibiotics have some negative effects on microbiome and body flora. Antibigrams from leeches digestive microbes and from the leech tanks are advised (5). But these measures take time, and they may not be very practical. Therefore, treatment of leeches with antibiotics, chlorhexidine and bleach solutions are being proposed. But we may have another potential weapon (bacteriophages) for this problem.

*Aeromonas* species is well known in marine life as they cause infections in fish and other marine stock that result in economic losses. They also cause infections such as gastroenteritis in humans and leeches introduce *Aeromonas* directly to blood and other bodily fluids.

Bacteriophages are specific bacteria devouring viruses which were in favor before the discovery of antibiotics. They only target specific bacteria, replicate until target bacteria is annihilated and very rarely cause systemic and local side effects. Small amount could be enough for therapy, and they also don't interfere with the normal flora. With the emergence of antibiotic resistance, phages again started to catch medical communities attention. In literature 5 phages (N21, W3, G65, Y71 and Y81) from Myoviridae ve Podoviridae families are reported against *A. hydrophila* (6). Phages can be a viable alternative for the treatment of leech associated infections. If the infections have started in the body, they can provide fast and effective treatment and local introduction of the phages in the affected tissues could be enough as they track down the target bacteria effectively. Alternatively, phages can be introduced into the tank water before leeches applied to the body. Research should be undertaken to determine the best way of using these bacteria hunters that would make leech therapy safer.

**Acknowledgements:** *none*

**Author Contributions:** *Concept: MEG, Literature Review: MÜ, Design: OÖ,MEG, Data acquisition: MÜ, Analysis and interpretation:MYS, Writing manuscript: OÖ,MÜ Critical revision of manuscript: MEG,MSY.*

**Conflict of Interest:** *The author has no conflicts of interest to declare.*

**Financial Disclosure:** *Author declared no financial support.*

## References

1. Giacometti L. Leeching in the twentieth century. *Am J Cardiol.* 1987;60(13):1128-31.
2. Hackenberger PN, Janis JE. A Comprehensive Review of Medicinal Leeches in Plastic and Reconstructive Surgery. *Plast Reconstr Surg Glob Open.* 2019;7(12):e2555.
3. Corral-Rodríguez MA, Macedo-Ribeiro S, Pereira PJ, et al. Leech-derived thrombin inhibitors: from structures to mechanisms to clinical applications. *J Med Chem.* 2010;53(10):3847-61.
4. Sig AK, Guney M, Uskudar Guclu A, et al. Medicinal leech therapy-an overall perspective. *Integr Med Res.* 2017;4(4):337-43.
5. Verriere B, Sabatier B, Carbonnelle E, et al. Medicinal leech therapy and *Aeromonas* spp. infection. *Eur J Clin Microbiol Infect Dis.* 2016;35(6):1001-6.
6. Liu, J, Gao, S, Dong, Y. et al. Isolation and characterization of bacteriophages against virulent *Aeromonas hydrophila*. *BMC Microbiol* 2020;(20), 141.