ISSN: 2287-6898
International
Journal of Bio-Pharma Research
Volume 11, Issue 4 (2022) pp.2744-2745

Commentary

Open Access

Leptospira biofilm development and social behaviour in natural and synthetic environment

Suzuki Endo*

Department of Genetic Engineering, Nagoya University, Nagoya, Japan.

Received: 30-Nov-2022, Manuscript No. IJBPR-22-83580; **Editor assigned:** 02-Dec-2022, Pre QC No. IJBPR -22-83580 (PQ); **Reviewed:** 16-Dec-2022, QC No. IJBPR -22-83580; **Revised:** 23-Dec-2022, Manuscript No. IJBPR -22-83580 (R); **Published:** 30-Dec-2022, DOI: 10.35248/2287-6898.22.11.2744-2745.

Description

The zoonotic pathogen *Leptospira* is responsible for human leptospirosis. In numerous biotic and abiotic situations, pathogenic and saprophytic *Leptospira* have been observed to produce biofilms. Cell growth is encouraged by biofilm, which also shields them from many forms of environmental stress. The pathogenicity and virulence of pathogenic bacteria may be enhanced by biofilm. A bacterial lifestyle that predominates in a variety of natural and artificial environments is biofilm development. A unique three-dimensional self-produced matrix that provides greater food supplies and supports enhanced growth and survival against biocides holds this community of bacteria together. A single microbial species several microbial species or a mix of prokaryotic and eukaryotic organisms may make up the community. An environment that is more secure for growing is created by the extracellular matrix that is self-produced and is composed of polysaccharides, proteins, lipids, and nucleic acids. Compared to planktonic bacteria, microorganisms living inside biofilms have very different lifestyles. The interactions between cells and their surroundings are primarily responsible for the creation of biofilms. Quorum Sensing (QS) a technique of communication used by bacteria in biofilms enables them to regulate biofilm formation respond to environmental stress produce secondary metabolites, and express virulence factors. Bacteria can develop antibiotic resistance through horizontal gene transfer within biofilms. Biofilm growth, maturation and dispersion are challenging processes and it is yet unclear how these processes are regulated [1]. Based on the environment in which biofilm production takes place, the nature of the biofilm matrix varies.

The environment that biofilms offer for interacting with several other microbial species in nature is crucial to metabolism. The metabolism of different bacterial species can be influenced by the interactions between the metabolites of different organisms. Through these interactions bacteria in the biofilm acquire biocide tolerance and resistance enabling them to endure in the presence of biocides. The biofilm's cell-cell communication plays a key role in determining how the bacteria react to their surroundings. Different bacterial species exchange metabolites and metabolite by products which are not the case with planktonic bacteria. Bacterial biofilms can occasionally be advantageous since they can be employed as a biological control against phytopathogens and biofertilizers. Bioremediation hazardous pollutant treatment wastewater treatment and biofuel production are just a few biotechnological uses for biofilms [2]. However the development of biofilms on surgical implants, prosthetic valves, feeding tubes and catheters has a significant impact on human health. The pathogenic bacteria can colonise the host effectively thanks to quorum sensing and biofilm development, and biofilms serve as a reservoir for releasing pathogenic planktonic cells into the environment. The formation of biofilms by pathogenic bacteria like *Staphylococcus aureus, Haemophilus influenza, Pseudomonas aeruginosa* and *Leptospira* interrogans may boost the pathogen's pathogenicity. The formation of biofilms by some pathogenic bacteria has been thoroughly investigated, but less is known about the formation of biofilms by neglected pathogens. *Leptospira*

Corresponding Author:
Endo S.,
E-mail: suzukie@gmail.com

is one such overlooked pathogen that creates biofilms in both natural and artificial environments.

Leptospira includes pathogenic, saprophytic, and intermediate species. It is a member of the phylum spirochetes and belongs to the family *Leptospira*ceae. *L. interrogans* and *Leptospira biflexa* were the two initial species of *Leptospira*, with the former housing all pathogenic strains and the latter housing saprophytes. Later *Leptospira* was divided into serogroups and serovars according to the lipopolysaccharides that were exposed on the surface. The most common zoonotic illness brought on by the pathogenic *Leptospira* species is leptospirosis [3]. Leptospirosis is common in areas with poor sanitation, dense populations and flooding. The illness produces foetal mummification and agalactia in animals, but also causes fever, renal and hepatic failure, pulmonary manifestation, and reproductive failure in people. Like other bacteria *Leptospira* has the ability to build biofilms. *Leptospira* cells are shielded by biofilms from a variety of physical and chemical stresses such as UV rays, high temperatures and antimicrobial substances, which in turn raise the likelihood of infection and pathogenesis [4]. Various *Leptospira* strains were used to research the bacteria's capacity to create biofilm.

According to reports, rather than floating, the majority of strains were able to develop biofilm mostly on surfaces. Additionally, the *L. interrogans* biofilm on polystyrene plates is more wash-resistant. *Leptospira* biofilm was discovered in a variety of aquatic habitats, including farmland, home sewage, and still pools of rainwater. The perfect conditions for bacterial growth and biofilm production are found in chronic wounds. According to studies, biofilms are present in 6% of acute wounds and 60% of chronic wounds. *S. aureus* is a common skin microflora that is connected to the growth of biofilm in chronic wounds. *Leptospira* may also produce biofilm in chronic wounds because they provide a source of access for the organism into the host. Staphylococcus and pathogenic and saprophytic *Leptospira* have been shown to co-aggregate and produce biofilm in a study on dual-species biofilm formation. *Leptospira* was discovered in many biofilm microbiomes in both animals and environmental water bodies. The biofilm formation and maturation metabolism may vary since the metabolism of pathogenic and saprophytic *Leptospira* is distinct [5]. Compared to the pathogenic *Leptospira* biofilm, the saprophytic *Leptospira* biofilm has garnered greater attention.

References

1. Ellis WA. Leptospirosis as a cause of reproductive failure. Vet Clin North Am Food Anim Pract. 1994;10(3):463-478.
2. Smith J. Weil's disease in the north-east of Scotland. Br J Ind Med. 1949;6(4):213.
3. Karygianni L, Ren Z, Koo H, Thurnheer T. Biofilm matrixome: Extracellular components in structured microbial communities. Trends Microbiol. 2020;28(8):668-681.
4. Veerachamy S, Yarlagadda T, Manivasagam G, Yarlagadda PK. Bacterial adherence and biofilm formation on medical implants: a review. J Eng Med. 2014;228(10):1083-1099.
5. Vinod Kumar K, Lall C, Raj RV, Vedhagiri K, Vijayachari P. Coexistence and survival of pathogenic leptospires by formation of biofilm with Azospirillum. FEMS Microbiol Ecol. 2015;91(6):661