

Application of HBOT in Treating Psoriasis

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Abstract

Hyperbaric oxygen therapy (HBOT) is a therapy that involves enclosing a patient in a pressure chamber and delivering 100% oxygen at an elevated atmospheric pressure. The chamber can be a monoplane chamber that fits one patient or a multiplace chamber that fits multiple patients. With the elevation of the atmospheric pressure, the lungs can gather more oxygen compared to normal air pressure. HBOT is considered a regenerative medicine, as it treats injuries and diseases by using the body's regenerative properties. HBOT has been approved by the FDA to treat several diseases, including skin diseases. Psoriasis is an immune-mediated disease which can cause problems in multiple organs. These problems include skin cell production in the deepest skin layer being accelerated, where immature cells build on the skin surface causing flaky, crusty patches covered with scales. Current treatments for psoriasis include biological injections, oral agents, phototherapy, and topical corticosteroids. However, current treatment for psoriasis poses a substantial economic burden due to lifelong care and continuous treatment. A treatment that has less economic burden and is less invasive would be an ideal alternative to treat psoriasis. This technique update focuses on the use of HBOT as a treatment for psoriasis.

Keywords: Hyperbaric oxygen chamber; Psoriasis; Anti-inflammatory; Regenerative medicine; Skin disease.

Introduction

Hyperbaric Oxygen Therapy (HBOT) is a therapy which involves the patient to be entirely enclosed in a pressure chamber, using a mask for oxygen delivery, and being exposed to 100% oxygen at an elevated atmospheric pressure [1]. The chamber can be a monoplane chamber which can fit one patient as seen in Figure 1, or a multiplace chamber which can fit multiple. With the

elevation of the atmospheric pressure, the lungs can gather more oxygen compared to normal air pressure [2]. HBOT is considered a regenerative medicine, as it treats injuries and diseases by using the body's regenerative properties [3]. HBOT has been approved by the FDA to treat several diseases, which can be seen in Figure 2 [4]. From this list are several skin diseases which can be treated in the use of HBOT. This study will focus on the

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using HBOT as treatment of a skin disease called psoriasis. Psoriasis is considered a chronic inflammatory skin disease that has strong genetic disposition and autoimmune pathogenic traits [5]. High-impact and difficult to treat psoriasis sites include the scalp, face, nails, genitalia, palms, and soles [6]. Psoriasis is an immune-mediated disease, meaning the immune system overreacts and causes problems [7]. These problems consist of skin cell production in the deepest skin layer being accelerated, where immature cells build on the skin surface causing flaky, crusty

patches covered with scales, which can be seen on the patient in Figure 3 [8]. Current treatments for psoriasis include biological injections, oral agents, phototherapy, and topical corticosteroids [9]. However, current treatment for Psoriasis poses substantial economic burden due to lifelong care and continuous treatment [10]. A treatment that has less economic burden along with less invasiveness would be an ideal alternative to treat psoriasis. Hence, this study will focus on using HBOT as an alternative treatment to psoriasis.



Figure 1: Integrant monoplace chamber at Regen U clinic.

HBOT for psoriasis

HBOT is known to have many healing properties, one of which is an anti-inflammatory, that can restore blood flow to areas of poor vasculature [11]. This can be seen through various skin diseases and wounds including necrotized wounds, diabetic foot ulcers, gangrene, and other infections of the skin [12]. When observing effects of chronic pain, brain activity, or immune dysregulation, direct effects are seen which improve the quality of life of affected individuals [13]. Being an irregularity of the immune system,

psoriasis falls into this category. In a study by Piotrowska. et al., two cases were studied, one on a patient with pustular psoriasis and arthritic psoriasis and a second patient with psoriasis vulgaris [14]. The patient suffering from pustular psoriasis and arthritic psoriasis completed 6 HBOT sessions for 60 minutes at 2.8 ATA which remitted the psoriasis completely. The patient suffering from psoriasis vulgaris showed skin erythema. Following 6 HBOT sessions at 2.0 ATA for 90 minutes, the patient experienced a significant relief from itching and reduced intensity of the skin erythema.

Disorders/Diseases cleared bt FDA for use of HBOT	Possible complications according to FDA
Air and gas bubbles in blood vessels	Ear and sinus pain
Anaemia(severe anaemia when blood transfusions cannot be used)	Middle ear injuries, including tympanic membrane rupture
Burns(severe and large burns treated at a specialized burn centre)	Temporary vision changes
Carbon monoxide poisoning	Lung collapse(rare)
Crush injury	
Decompression sickness(diving risk)	
Gas gangrene	
Hearing loss(complete hearing loss that occurs suddenly and without any know cause)	
Infection of skin and bone(severe)	
Radiation injury	
Skin graft flap at risk of tissue death	
Vision loss(when sudden and painless in open eye due to blockage of blood flow)	
Wounds(non-healing, diabetic foot ulcers)	

Table 1: Current FDA approved uses for hyperbaric oxygen therapy.



Figure 2: Psoriasis shown on the individual's arm.

Conclusion

When reviewing the study, psoriasis is a chronic disease that is notoriously unpredictable. Hence it is impossible to know when the case of psoriasis will go into remission and for how long [15]. However,

when reviewing the study by Piotrowska. et al., one patient had their psoriasis go into remission and the other patient experienced relief from the itch and reduced intensity of the skin erythema. This gives promising signs when reviewing the application of HBOT for

psoriasis. When looking at the economic burden of HBOT, for diseases such as diabetic foot ulcers, it reduces the economic burden due to less resources required. This can be

explored in the future once HBOT becomes a primary treatment and then the economic burden can be researched.

References

1. Heyboer M 3rd, Sharma D, Santiago W, McCulloch N. Hyperbaric Oxygen Therapy: Side Effects Defined and Quantified. *Adv Wound Care (New Rochelle)*. 2017;6(6):210-24. [PubMed](#) | [CrossRef](#)
2. Barata P, Cervaens M, Resende R, Camacho O, Marques F. Hyperbaric oxygen effects on sports injuries. *Ther Adv Musculoskelet Dis*. 2011;3(2):111-21. [PubMed](#) | [CrossRef](#)
3. Mason C, Dunnill P. A Brief Definition of Regenerative Medicine. *Regen Med*. 2008;3(1):1-5. [PubMed](#) | [CrossRef](#)
4. Foods and Drugs Administration. Hyperbaric Oxygen Therapy: Get the Facts. 2021.
5. Rendon A, Schäkel K. Psoriasis Pathogenesis and Treatment. *Int J Mol Sci*. 2019;20(6):1475. [PubMed](#) | [CrossRef](#)
6. Raharja A, Mahil SK, Barker JN. Psoriasis: A Brief Overview. *Clin Med (Lond)*. 2021;21(3):170-3. [PubMed](#) | [CrossRef](#)
7. Dhabale A, Nagpure S. Types of Psoriasis and their Effects on the Immune System. *Cureus*. 2022;14(9):e29536. [PubMed](#) | [CrossRef](#)
8. Psoriasis. NHS. 2018.
9. Lee HJ, Kim M. Challenges and Future Trends in the Treatment of Psoriasis. *Int J Mol Sci*. 2023;24(17):13313. [PubMed](#) | [CrossRef](#)
10. Feldman SR, Tian H, Wang X, Germino R. Health Care Utilization and Cost Associated with Biologic Treatment Patterns Among Patients with Moderate to Severe Psoriasis: Analyses from a Large U.S. Claims Database. *J Manag Care Spec Pharm*. 2019;25(4):479-88. [PubMed](#) | [CrossRef](#)
11. Sen S, Sen S. Therapeutic Effects of Hyperbaric Oxygen: Integrated Review. *Med Gas Res*. 2021;11(1):30-3. [PubMed](#) | [CrossRef](#)
12. Slater G, Bachmid Z. Hyperbaric Oxygen Therapy as an Accelerator in Regenerative Medicine. *J Regen Biol Med*. 2023;5(4):293-301.
13. Ortega MA, Fraile-Martinez O, García-Montero C, Callejón-Peláez E, Sáez MA, Álvarez-Mon MA, et al. A General Overview on the Hyperbaric Oxygen Therapy: Applications, Mechanisms and Translational Opportunities. *Medicina (Kaunas)*. 2021;57(9):864. [PubMed](#) | [CrossRef](#)
14. Piotrowska A, Zych M, Oliwa J. Application of Hyperbaric Oxygen Therapy in Skin Disease Treatment. *Med Rehabi*. 2021;25(3):31-7. [CrossRef](#)
15. How long will I have to treat my psoriasis? American Academy of Dermatology Association. 2024.