

BÖLÜM 20

KRONİK VE ZOR YARALARDA BESLENME

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GİRİŞ

Kronik yaralar ağrı, hareketsizlik, yara kokusu ve akıntı gibi hastalığa bağlı semptomlar yaratan ve sağlık sistemi ile bireylerin sosyal yaşamı için önemli sorunlar ortaya çıkaran bir durumdur. Özellikle kronik yaraların prevalansı yaşla birlikte artmaktadır (1). Amerika Birleşik Devletleri'nde senelik yaklaşık 3-6 milyon bireyin, iyileşmeyen yaralardan etkilendiği bildirilmiştir (2). Öte yandan yara bakımı, karmaşık ve yüksek maliyetli bir süreçtir (3).

Beslenme, DNA, RNA ve mikroRNA'lar gibi anahtar molekülleri hedefleyerek epigenetik, yara iyileşmesini etkileyebilmektedir (4). Epigenetik faktörler ayrıca transkripsiyon faktörlerini, sitokinleri, hücre dışı matris proteinlerini ve glikozaminoglikanı da düzenlemektedir. Bu açıdan da beslenme, yara iyileşme sürecinin her adımını aktif olarak etkileyebilen epigenetik bir sinyaldir (5). Yara iyileşmesinde amino asitlerin, vitaminlerin ve minerallerin önemli rolleri bulunmaktadır. Bununla birlikte bazı doğal bileşiklerin, süreci hızlandırmak için sinerjik bir etkiye sahip olabileceği düşünülmektedir (6).

Nükleik asitlerin (DNA ve RNA), proteinlerin, fonksiyonel doku olgunlaşması ve farklılaşmasında yer alan diğer faktörlerin sentezi için yeterli miktarda besin alımı gereklidir. Öte yandan yetersiz beslenme, büyük ölçüde iyileşme sürecinin gecikmesi veya başarısızlığı ile ilişkilidir (7). Yetersiz beslenme inflamatuvar fazı uzatarak, fibroblast proliferasyonunu ve yaranın gerilme gücünü azaltarak, enfeksiyon oranlarını artırarak ve kollajen üretimini değiştirerek yara iyileşme evresinin normal sürecini etkilemektedir (8).

Nütrisyonel Değerlendirme ve Yara İyileşmesi

Ulusal Sağlık ve Klinik Mükemmellik Enstitüsü'nün rehberliği, tüm hastaların hastaneye başvurularında ve ilk ayakta tedavilerinde yetersiz beslenme açısından taranması gerektiğini vurgulamaktadır. Kronik yaraları olan hastalar da bu noktada taranması gereken grup içerisinde yer almaktadır (9). Deri ülserasyonuna göre beslenme durumunu değerlendirmek için tarihsel, hematolojik ve antropomorfik verileri içeren çeşitli tarama araçları geliştirilmiş ve doğrulanmıştır. Bunlara Subjektif Global De-

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Herhangi bir şüphe varsa, daha fazla tıbbi tavsiye alınmalıdır (Kanıt düzeyi: D) (80).

Alt Ekstremitte Venöz Hastalığı Olan Hastalarda Yaraların Tedavisi Rehberi 2019 'da beslenmeyle ilgili önerilere rastlanmıştır. Bu rehberde, iyileşmeyen venöz bacak ülserleri olan ve beslenme yetersizliğinden şüphelenilen bireyleri, değerlendirme ve uygun müdahaleler için kayıtlı bir diyetisyene yönlendirilmesi gerektiği vurgulanmıştır (Kanıt düzeyi = C; Fayda/etkililik/zarar = Sınıf I; Kanıt kalitesi= Uzman görüşü). Besin alımı ve yeterli besinin mevcudiyeti, besini elde etme gücü dahil olmak üzere hastanın beslenme durumu değerlendirilmelidir (Kanıt düzeyi = C; Fayda/etkililik/zarar = Sınıf II; Kanıt kalitesi = Düşük) (81).

KAYNAKLAR

- Heyer K, Herberger K, Protz K, Glaeske G, Augustin M. Epidemiology of chronic wounds in Germany: analysis of statutory health insurance data. *Wound Repair Regen.* 2016;24(2):434-442.
- Järbrink K, Ni G, Sönnergren H. et al. Prevalence and incidence of chronic wounds and related complications: a protocol for a systematic review. 2016;5(1):152.
- Al-Gharibi KA, Sharstha S, Al-Faras MA. Cost-Effectiveness of Wound Care: A concept analysis. *Sultan Qaboos Univ Med J.* 2018;18(4):e433-e439.
- Palmieri B, Vadalà M, Laurino C. Review of the molecular mechanisms in wound healing: new therapeutic targets?. *J Wound Care.* 2017;26(12):765-775.
- Saldanha SN, Royston KJ, Udayakumar N, Tollefsbol TO. Epigenetic Regulation of Epidermal Stem Cell Biomarkers and Their Role in Wound Healing. *Int J Mol Sci.* 2015;17(1):16.
- Guo S, Dipietro LA. Factors affecting wound healing. *J Dent Res.* 2010;89(3):219-229.
- Brown KL, Phillips TJ. Nutrition and wound healing. *Clin Dermatol.* 2010;28(4):432-439.
- Witts BAT, Martin T. The role of nutrition in successful wound healing. *J Community Nurs.* 2018;32(4).
- Medlin S. Nutrition for wound healing. *Br J Nurs.* 2012;21(12):S11-2, S14-5.
- Palmieri B, Vadalà M, Laurino C. Nutrition in wound healing: investigation of the molecular mechanisms, a narrative review. *J Wound Care.* 2019;28(10):683-693.
- Chang CC, Lan YT, Jiang JK, et al. Risk factors for delayed perineal wound healing and its impact on prolonged hospital stay after abdominoperineal resection. *World J Surg Oncol.* 2019;17(1):226.
- Mahakalkar CC, Modi S, Yeola M, Kaple MN, Patwardhan MA, Laddha P. Malnutrition in hospitalised patients; a real concern in surgical outcomes. *Int J Res Med Sci* 2014;2:250-7.
- Saghaleini SH, Dehghan K, Shadvar K, Sanaie S, Mahmoodpoor A, Ostadi Z. Pressure Ulcer and Nutrition. *Indian J Crit Care Med.* 2018;22(4):283-289.
- Serpa LF, Santos VL. Validity of the Braden Nutrition Subscale in predicting pressure ulcer development. *J Wound Ostomy Continence Nurs.* 2014;41(5):436-443.
- Kelechi TJ, Brunette G, Bonham PA, et al. 2019 Guideline for Management of Wounds in Patients With Lower-Extremity Venous Disease (LEVD): An Executive Summary. *J Wound Ostomy Continence Nurs.* 2020;47(2):97-110.
- Demling RH. Nutrition, anabolism, and the wound healing process: an overview. *Eplasty.* 2009;9:e9.
- Looijaard WGPM, Molinger J, Weijs PJM. Measuring and monitoring lean body mass in critical illness. *Curr Opin Crit Care.* 2018;24(4):241-247.
- Moran L, Custer P, Murphy G. Nutritional assessment of lean body mass. *JPEN J Parenter Enteral Nutr.* 1980;4:595
- Harris RB. Chronic and acute effects of stress on energy balance: are there appropriate animal models?. *Am J Physiol Regul Integr Comp Physiol.* 2015;308(4):R250-R265.
- Merryfield C. Nutrition and Wound Care. *Complete Nutrition* 2010;10(4): 26-8.
- Crowe T. Nutrition therapy in the prevention and treatment of pressure ulcers. *Wound Practice Res.* 2009;17:90-9
- Posthauer ME, Dorner B, Collins N. Nutrition: a critical component of wound healing. *Adv Skin Wound Care.* 2010;23(12):560-574.
- Aya KL, Stern R. Hyaluronan in wound healing: re-discovering a major player. *Wound Repair Regen.* 2014;22(5):579-593.
- Takayama Y. (2012) *Lactoferrin and its Role in Wound Healing*, 1st edition, Netherlands, Springer.
- Xuan YH, Huang BB, Tian HS, et al. High-glucose inhibits human fibroblast cell migration in wound healing via repression of bFGF-regulating JNK phosphorylation. *PLoS One.* 2014;9(9):e108182.
- Kanazawa S, Fujiwara T, Matsuzaki S, et al. bFGF regulates PI3-kinase-Rac1-JNK pathway and promotes fibroblast migration in wound healing. *PLoS One.* 2010;5(8):e12228.
- Lamers ML, Almeida ME, Vicente-Manzanares M, Horwitz AF, Santos MF (2011) High glucose-mediated oxidative stress impairs cell migration. *PLoS One* 6: e22865
- Hew JJ, Parungao RJ, Mooney CP, et al. Low-protein diet accelerates wound healing in mice post-acute injury. *Burns Trauma.* 2021;9:tkab010.
- Jara CP, Mendes NF, Prado TPD, de Araújo EP. Bioactive Fatty Acids in the Resolution of Chronic Inflammation in Skin Wounds. *Adv Wound Care (New*

- Rochelle). 2020;9(8):472-490.
30. Innes JK, Calder PC. Omega-6 fatty acids and inflammation. *Prostaglandins Leukot Essent Fatty Acids*. 2018;132:41-48.
 31. Najmi M, Vahdat Shariatpanahi Z, Tolouei M, Amiri Z. Effect of oral olive oil on healing of 10-20% total body surface area burn wounds in hospitalized patients. *Burns*. 2015;41(3):493-496.
 32. Jaffe L, Wu S. The Role of Nutrition in Chronic Wound Care Management. *PODIATRY MANAGEMENT*. 2017; 77-83.
 33. Palmieri B, Vadalà M, Laurino C. Nutrition in wound healing: investigation of the molecular mechanisms, a narrative review. *J Wound Care*. 2019;28(10):683-693.
 34. Karna E, Szoka L, Huynh TYL, Palka JA. Proline-dependent regulation of collagen metabolism. *Cell Mol Life Sci*. 2020;77(10):1911-1918. doi:10.1007/s00018-019-03363-3
 35. Albaugh VL, Mukherjee K, Barbul A. Proline Precursors and Collagen Synthesis: Biochemical Challenges of Nutrient Supplementation and Wound Healing. *J Nutr*. 2017;147(11):2011-2017.
 36. Barbul A. Proline precursors to sustain Mammalian collagen synthesis. *J Nutr*. 2008;138(10):2021S-2024S.
 37. Oguz A, Uslukaya O, Alabalik U, Turkoglu A, Kaplan M, Bozdogan Z. Topical N-acetylcysteine improves wound healing comparable to dexpantenol: an experimental study. *Int Surg*. 2015;100(4):656-661.
 38. Salamon S, Kramar B, Marolt TP, Poljšak B, Milisav I. Medical and Dietary Uses of N-Acetylcysteine. *Antioxidants (Basel)*. 2019;8(5):111. Published 2019 Apr 28.
 39. Cruzat V, Macedo Rogero M, Noel Keane K, Curi R, Newsholme P. Glutamine: Metabolism and Immune Function, Supplementation and Clinical Translation. *Nutrients*. 2018;10(11):1564
 40. Häussinger D, Schliess F. Glutamine metabolism and signaling in the liver. *Front Biosci* 2007; 12(1):371-391.
 41. Blass SC, Goost H, Tolba RH, et al. Time to wound closure in trauma patients with disorders in wound healing is shortened by supplements containing antioxidant micronutrients and glutamine: a PRCT. *Clin Nutr*. 2012;31(4):469-475.
 42. Bollhalder L, Pfeil AM, Tomonaga Y, Schwenkglens M. A systematic literature review and meta-analysis of randomized clinical trials of parenteral glutamine supplementation. *Clin Nutr*. 2013;32(2):213-223.
 43. García-de-Lorenzo A, Zarazaga A, García-Luna PP, et al. Clinical evidence for enteral nutritional support with glutamine: a systematic review. *Nutrition*. 2003;19(9):805-811.
 44. Jun C, Choi Y, Lim SM, et al. Disturbance of the glutamatergic system in mood disorders. *Exp Neurol*. 2014;23(1):28-35. doi:10.5607/en.2014.23.1.28
 45. Arribas-López E, Zand N, Ojo O, Snowden MJ, Kochhar T. The Effect of Amino Acids on Wound Healing: A Systematic Review and Meta-Analysis on Arginine and Glutamine. *Nutrients*. 2021;13(8):2498.
 46. Badr G, Badr BM, Mahmoud MH, Mohany M, Rabah DM, Garraud O. Treatment of diabetic mice with undenatured whey protein accelerates the wound healing process by enhancing the expression of MIP-1 α , MIP-2, KC, CX3CL1 and TGF- β in wounded tissue. *BMC Immunol*. 2012;13:32.
 47. Roohani N, Hurrell R, Kelishadi R, Schulin R. Zinc and its importance for human health: An integrative review. *J Res Med Sci*. 2013;18(2):144-157.
 48. Livingstone C. Zinc: physiology, deficiency, and parenteral nutrition. *Nutr Clin Pract*. 2015;30(3):371-382.
 49. Gupta M, Mahajan VK, Mehta KS, Chauhan PS. Zinc therapy in dermatology: a review. *Dermatol Res Pract*. 2014;2014:709152. doi:10.1155/2014/709152
 50. Kogan S, Sood A, Garnick MS. Zinc and Wound Healing: A Review of Zinc Physiology and Clinical Applications. *Wounds*. 2017;29(4):102-106.
 51. Besecker BY, Exline MC, Hollyfield J, et al. A comparison of zinc metabolism, inflammation, and disease severity in critically ill infected and noninfected adults early after intensive care unit admission. *Am J Clin Nutr*. 2011;93(6):1356-1364.
 52. Gammoh NZ, Rink L. Zinc in Infection and Inflammation. *Nutrients*. 2017;9(6):624.
 53. Lin PH, Sermersheim M, Li H, Lee PHU, Steinberg SM, Ma J. Zinc in Wound Healing Modulation. *Nutrients*. 2017;10(1):16. Published 2017 Dec 24.
 54. Lin PH, Sermersheim M, Li H, Lee PHU, Steinberg SM, Ma J. Zinc in Wound Healing Modulation. *Nutrients*. 2017;10(1):16. Published 2017 Dec 24.
 55. Wilkinson EA. Oral zinc for arterial and venous leg ulcers. *Cochrane Database Syst Rev*. 2012;(8):CD001273.
 56. O'Connor S, Murphy S. Chronic venous leg ulcers: Is topical zinc the answer? A review of the literature. *Adv. Skin Wound Care*. 2014;27:35-44.
 57. Cereda E, Gini A, Pedrolli C, Vanotti A. Disease-specific, versus standard, nutritional support for the treatment of pressure ulcers in institutionalized older adults: a randomized controlled trial. *J Am Geriatr Soc*. 2009;57(8):1395-1402.
 58. Desneves K, Todorovic B, Cassar A, Crowe T. Treatment with supplementary arginine, vitamin C and zinc in patients with pressure ulcers: A randomised controlled trial. *Clin Nutr* 2005; 24(6):979-987.
 59. Razzaghi R, Pidar F, Momen-Heravi M, Bahmani F, Akbari H, Asemi Z. Magnesium Supplementation and the Effects on Wound Healing and Metabolic Status in Patients with Diabetic Foot Ulcer: a Randomized, Double-Blind, Placebo-Controlled Trial. *Biol Trace Elem Res*. 2018;181(2):207-215.
 60. Vetchy MPJV. Biological role of copper as an essential trace element in the human organism. *Ceska Slov Farm*. 2018;67(4):143-153
 61. Philips N, Samuel P, Parakandi H, Gopal S, Siomyk H, Ministro A, Thompson T, Borkow G. Beneficial regulation of fibrillar collagens, heat shock protein-47,

- elastin fiber components, transforming growth factor-beta1, vascular endothelial growth factor and oxidative stress effects by copper in dermal fibroblasts. *Connect Tissue Res.* 2012;53(5):373-378
62. Solano F. On the Metal Cofactor in the Tyrosinase Family. *Int J Mol Sci.* 2018;19(2):633. Published 2018 Feb 23. doi:10.3390/ijms19020633
 63. Toxqui L, Vaquero MP. Chronic iron deficiency as an emerging risk factor for osteoporosis: a hypothesis. *Nutrients.* 2015;7(4):2324-2344.
 64. Wright JA, Oddy MJ, Richards T. Presence and characterisation of anaemia in diabetic foot ulceration. *Anemia.* 2014;2014:104214.
 65. Takayama Y, Aoki R. Roles of lactoferrin on skin wound healing. *Biochem Cell Biol.* 2012;90:497-503.
 66. Kuru R, Yarat A. Bor ve Sağlığımıza Olan Etkilerine Güncel Bir Bakış. *Clin Exp Health Sci* 2017; 7:104-114.
 67. Coban FK, Ince S, Kucukkurt I, Demirel HH, Hazman O. Boron attenuates malathion-induced oxidative stress and acetylcholinesterase inhibition in rats. *Drug Chem. Toxicol.* 2015;38(4): 391-9.
 68. Konca M, Korkmaz M. Comparison of Effects of Administration of Oral or Topical Boron on Wound Healing and Oxidative Stress in Rats. *Kocatepe Vet J.* 2020;13(1):11-18.
 69. Demirci S, Doğan A, Aydın S, Dülger EÇ, Şahin F. Boron promotes streptozotocin-induced diabetic wound healing: roles in cell proliferation and migration, growth factor expression, and inflammation. *Mol Cell Biochem.* 2016;417:119- 133.
 70. Polcz ME, Barbul A. The Role of Vitamin A in Wound Healing. *Nutr Clin Pract.* 2019;34(5):695-700.
 71. Strange RC, Shipman KE, Ramachandran S. Metabolic syndrome: a review of the role of vitamin D in mediating susceptibility and outcome. *World J Diabetes.* 2015;6:896-911.
 72. Ding J, Kwan P, Ma Z, et al. Synergistic effect of vitamin D and low concentration of transforming growth factor beta 1, a potential role in dermal wound healing. *Burns.* 2016;42:1277- 1286
 73. Tiwari S, Pratyush DD, Gupta SK, Singh SK. Vitamin D deficiency is associated with inflammatory cytokine concentrations in patients with diabetic foot infection. *Br J Nutr.* 2014;112:1938-1943
 74. Jiang Q. Natural forms of vitamin E: metabolism, antioxidant, and anti-inflammatory activities and their role in disease prevention and therapy. *Free Radic Biol Med.* 2014;72:76- 90.
 75. Lee GY, Han SN. The Role of Vitamin E in Immunity. *Nutrients.* 2018;10(11):1614.
 76. Hobson R. Vitamin E and wound healing: an evidence-based review. *Int Wound J.* 2016;13(3):331-335.
 77. Carr, A.C.; Vissers, M.C. Good nutrition matters: Hypovitaminosis C associated with depressed mood and poor wound healing. *N. Z. Med. J.* 2012, 125, 107-109.
 78. Barbosa E, Faintuch J, Machado Moreira EA, et al. Supplementation of vitamin E, vitamin C, and zinc attenuates oxidative stress in burned children: a randomized, double-blind, placebo-controlled pilot study. *J Burn Care Res.* 2009;30(5):859-866.
 79. Yun IS, Yoo HS, Kim YO, Rah DK. Improved scar appearance with combined use of silicone gel and vitamin C for Asian patients: a comparative case series. *Aesthetic Plast Surg.* 2013;37(6):1176-1181.
 80. Gould L, Stuntz M, Giovannelli M, et al. Wound Healing Society 2015 update on guidelines for pressure ulcers. *Wound Repair Regen.* 2016;24(1):145-162.
 81. HSE National Wound Management Guidelines, The HSE National Wound Management Guidelines 2018 supersede all previous wound management guidelines, 2018; Reference Number: CSPD004/2018.
 82. Kelechi TJ, Brunette G, Bonham PA, et al. 2019 Guideline for Management of Wounds in Patients With Lower-Extremity Venous Disease (LEVD): An Executive Summary. *J Wound Ostomy Continence Nurs.* 2020;47(2):97-110.