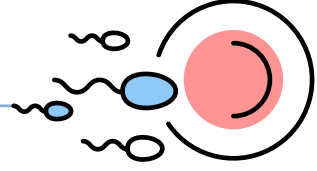


BÖLÜM 11



İNFERTİLİTEDE ÇEVRESEL FAKTÖRLER VE AÇIKLANAMAYAN İNFERTİLİTE

Pınar BAYRAM¹

GİRİŞ

İnfertil bireylerin sayısını azaltmak, birçok sağlık kuruluşunun birinci önceliği haline gelmiştir. Günlük yaşamda farkında olunmasa bile birçok faktör insan sağlığını olumsuz yönde etkileyebilmekte; üreme sağlığı ve doğurganlık, bireylerin yaşam tarzları ve çevresel faktörler tarafından etkilenebilmektedir.

İnsanlar günlük yaşamda üreme sağlığına yönelik biyolojik (virüsler), fiziksel (radyasyon) ve toksik (kimyasallar) birçok potansiyel tehditle karşılaşmaktadır (1). İnsan vücudunun kendini korumak için savunma mekanizmaları olsa da, bu tehditler soluma, temas, aktarım yoluyla kişinin sağlığını bozabilmekte ve doğurganlığı olumsuz yönde etkileyebilmektedir (2). Yapılan araştırmalar pestisitler, gübreler ve endüstriyel ürünler (plastikleştiriciler ve fitoöstrojenler) şeklindeki endokrin bozucu kimyasallar gibi çeşitli kimyasallara uzun süre maruz kalmanın, çeşitli hormonal yolları bozarak doğurganlığın azalmasıyla ilişkili olduğunu göstermiştir (3). Ek olarak; hava kirliliği, ağır metaller, mesleki maruziyet ve radyasyon gibi diğer çevresel faktörlere maruz kalmanın kısırlığa neden olabileceği veya tekrarlayan düşükler gibi gebelik komplikasyonlarının eğilimlerini artırabileceği belirtilmiştir (4). Dahası, sosyo-ekonomik ve demografik faktörler, sigara dumanı, giyilen dar kıyafetler ve hatta Covid-19 ile enfekte olmak da infertilite oranını yükseltebilmektedir.

¹ Dr. Öğr. Üyesi, Kafkas Üniversitesi, Tıp Fakültesi, Histoloji ve Embriyoloji AD., pinarbayram@yandex.com

bireylerin çocuk sahibi olamamasına neden olmaktadır. İnfertilite tanısı almış bireylerin beslenmesine ve olumsuz çevresel faktörlere dikkat etmesi, bunun için karşı önlemler alması bireylerin çocuk sahibi olmasına katkıda bulunabilir. Belki de açıklanamayan infertilite durumunu geçici bir dönem ile sınırlı tutarak bireylerin fertilitelerini tekrar kazandırabilir.

KAYNAKLAR

1. Sharma, R., K.R. Biedenharn, J.M. Fedor, et al. Lifestyle factors and reproductive health: taking control of your fertility. *Reprod Biol Endocrinol*, 2013; 11; 66. DOI: 10.1186/1477-7827-11-66.
2. Chalupka, S. and A.N. Chalupka. The impact of environmental and occupational exposures on reproductive health. *J Obstet Gynecol Neonatal Nurs*, 2010; 39 (1); 84-102. DOI: 10.1111/j.1552-6909.2009.01091.x.
3. Ding, R., Y. Jin, X. Liu, et al. Characteristics of DNA methylation changes induced by traffic-related air pollution. *Mutat Res Genet Toxicol Environ Mutagen*, 2016; 796; 46-53. DOI: 10.1016/j.mrgentox.2015.12.002.
4. Hart, R.J. Physiological Aspects of Female Fertility: Role of the Environment, Modern Lifestyle, and Genetics. *Physiol Rev*, 2016; 96 (3); 873-909. DOI: 10.1152/physrev.00023.2015.
5. Chiang, C., S. Mahalingam and J.A. Flaws. Environmental Contaminants Affecting Fertility and Somatic Health. *Semin Reprod Med*, 2017; 35 (3); 241-249. DOI: 10.1055/s-0037-1603569.
6. Deng, Z., F. Chen, M. Zhang, et al. Association between air pollution and sperm quality: A systematic review and meta-analysis. *Environ Pollut*, 2016; 208 (Pt B); 663-9. DOI: 10.1016/j.envpol.2015.10.044.
7. Slama, R., S. Bottagisi, I. Solansky, et al. Short-term impact of atmospheric pollution on fecundability. *Epidemiology*, 2013; 24 (6); 871-9. DOI: 10.1097/EDE.0b013e3182a702c5.
8. Martin, R.H., K. Hildebrand, J. Yamamoto, et al. An increased frequency of human sperm chromosomal abnormalities after radiotherapy. *Mutat Res*, 1986; 174 (3); 219-25. DOI: 10.1016/0165-7992 (86)90155-7.
9. Fischbein, A., N. Zabludovsky, F. Eltes, et al. Ultramorphological sperm characteristics in the risk assessment of health effects after radiation exposure among salvage workers in Chernobyl. *Environ Health Perspect*, 1997; 105 Suppl 6; 1445-9. DOI: 10.1289/ehp.97105s61445.
10. Kesari, K.K., A. Agarwal and R. Henkel. Radiations and male fertility. *Reprod Biol Endocrinol*, 2018; 16 (1); 118. DOI: 10.1186/s12958-018-0431-1.
11. Santivasi, W.L. and F. Xia. Ionizing radiation-induced DNA damage, response, and repair. *Antioxid Redox Signal*, 2014; 21 (2); 251-9. DOI: 10.1089/ars.2013.5668.
12. De Santis, M., E. Cesari, E. Nobili, et al. Radiation effects on development. *Birth Defects Res C Embryo Today*, 2007; 81 (3); 177-82. DOI: 10.1002/bdrc.20099.
13. Lee, C.J. and Y.D. Yoon. Gamma-radiation-induced follicular degeneration in the prepubertal mouse ovary. *Mutat Res*, 2005; 578 (1-2); 247-55. DOI: 10.1016/j.mrfmmm.2005.05.019.
14. Bala, R., V. Singh, S. Rajender, et al. Environment, Lifestyle, and Female Infertility. *Reprod Sci*, 2021; 28 (3); 617-638. DOI: 10.1007/s43032-020-00279-3.

15. Kawakami, T., M. Yoshimi, Y. Kadota, et al. Prolonged endoplasmic reticulum stress alters placental morphology and causes low birth weight. *Toxicol Appl Pharmacol*, 2014; 275 (2); 134-44. DOI: 10.1016/j.taap.2013.12.008.
16. Sikka, S.C. and R. Wang. Endocrine disruptors and estrogenic effects on male reproductive axis. *Asian J Androl*, 2008; 10 (1); 134-45. DOI: 10.1111/j.1745-7262.2008.00370.x.
17. Reis, M.M., A.C. Moreira, M. Sousa, et al. Sertoli cell as a model in male reproductive toxicology: Advantages and disadvantages. *J Appl Toxicol*, 2015; 35 (8); 870-83. DOI: 10.1002/jat.3122.
18. Hruska, K.S., P.A. Furth, D.B. Seifer, et al. Environmental factors in infertility. *Clin Obstet Gynecol*, 2000; 43 (4); 821-9. DOI: 10.1097/00003081-200012000-00014.
19. Dickman, M.D. and K.M. Leung. Mercury and organochlorine exposure from fish consumption in Hong Kong. *Chemosphere*, 1998; 37 (5); 991-1015. DOI: 10.1016/s0045-6535 (98)00006-x.
20. Dickman, M.D., C.K. Leung and M.K. Leung. Hong Kong male subfertility links to mercury in human hair and fish. *Sci Total Environ*, 1998; 214; 165-74. DOI: 10.1016/s0048-9697 (98)00062-x.
21. Sifakis, S., M. Mparmpas, O.P. Soldin, et al., *Pesticide exposure and health related issues in male and female reproductive system*. 2011: IntechOpen.
22. Mehrpour, O., P. Karrari, N. Zamani, et al. Occupational exposure to pesticides and consequences on male semen and fertility: a review. *Toxicol Lett*, 2014; 230 (2); 146-56. DOI: 10.1016/j.toxlet.2014.01.029.
23. Idrovo, A.J., L.H. Sanin, D. Cole, et al. Time to first pregnancy among women working in agricultural production. *Int Arch Occup Environ Health*, 2005; 78 (6); 493-500. DOI: 10.1007/s00420-005-0615-9.
24. Deyhoul, N., T. Mohamaddoost and M. Hosseini. Infertility-related risk factors: a systematic review. *Int J Womens Health Reprod Sci*, 2017; 5 (1); 24-29.
25. Prata, N., A. Fraser, M.J. Huchko, et al. Women's Empowerment and Family Planning: A Review of the Literature. *J Biosoc Sci*, 2017; 49 (6); 713-743. DOI: 10.1017/S0021932016000663.
26. Bongaarts, J. The causes of educational differences in fertility in Sub-Saharan Africa. *Vien-na yearbook of population research*, 2010; 31-50.
27. Jung, A. and H.C. Schuppe. Influence of genital heat stress on semen quality in humans. *Andrologia*, 2007; 39 (6); 203-15. DOI: 10.1111/j.1439-0272.2007.00794.x.
28. Mieusset, R., B. Bengoudifa and L. Bujan. Effect of posture and clothing on scrotal temperature in fertile men. *J Androl*, 2007; 28 (1); 170-5. DOI: 10.2164/jandrol.106.000646.
29. Syrop, C.H., J.D. Dawson, K.J. Husman, et al. Ovarian volume may predict assisted reproductive outcomes better than follicle stimulating hormone concentration on day 3. *Hum Reprod*, 1999; 14 (7); 1752-6. DOI: 10.1093/humrep/14.7.1752.
30. Soares, S.R. and M.A. Melo. Cigarette smoking and reproductive function. *Curr Opin Obstet Gynecol*, 2008; 20 (3); 281-91. DOI: 10.1097/GCO.0b013e3282fc9c1e.
31. Zegers-Hochschild, F., G.D. Adamson, S. Dyer, et al. The International Glossary on Infertility and Fertility Care, 2017. *Hum Reprod*, 2017; 32 (9); 1786-1801. DOI: 10.1093/humrep/dex234.
32. Siristatidis, C. and S. Bhattacharya. Unexplained infertility: does it really exist? Does it matter? *Hum Reprod*, 2007; 22 (8); 2084-7. DOI: 10.1093/humrep/dem117.
33. Collins, J.A. and A. Van Steirteghem. Overall prognosis with current treatment of infertility. *Hum Reprod Update*, 2004; 10 (4); 309-16. DOI: 10.1093/humupd/dmh029.

34. BR, C., B. RE and A. R, *Essential Reproductive Medicine*. 2005, New York: McGraw-Hill Medical Publishing Division.
35. Stewart, J.D., M.C. Pasternak, N. Pereira, et al. Contemporary Management of Unexplained Infertility. *Clin Obstet Gynecol*, 2019; 62 (2); 282-292. DOI: 10.1097/GRF.0000000000000450.
36. Collins, J.A., E.A. Burrows and A.R. Wilan. The prognosis for live birth among untreated infertile couples. *Fertil Steril*, 1995; 64 (1); 22-8.
37. Kamath, M.S. and S. Bhattacharya. Demographics of infertility and management of unexplained infertility. *Best Pract Res Clin Obstet Gynaecol*, 2012; 26 (6); 729-38. DOI: 10.1016/j.bpobgyn.2012.08.001.
38. Galliano, D. and A. Pellicer, *Potential etiologies of unexplained infertility in females*, in *Unexplained Infertility*. 2015, Springer. p. 141-147.
39. Hardin, B.M. and E.D. Kim, *Potential Male Etiologies of Unexplained Infertility*, in *Unexplained Infertility*. 2015, Springer. p. 53-56.
40. Li, F., H. Lu, Q. Zhang, et al. Impact of COVID-19 on female fertility: a systematic review and meta-analysis protocol. *BMJ Open*, 2021; 11 (2); e045524. DOI: 10.1136/bmjopen-2020-045524.
41. Koc, E. and B.B. Keseroglu. Does COVID-19 Worsen the Semen Parameters? Early Results of a Tertiary Healthcare Center. *Urol Int*, 2021; 105 (9-10); 743-748. DOI: 10.1159/000517276.
42. Temiz, M.Z., M.M. Dincer, I. Hacibey, et al. Investigation of SARS-CoV-2 in semen samples and the effects of COVID-19 on male sexual health by using semen analysis and serum male hormone profile: A cross-sectional, pilot study. *Andrologia*, 2021; 53 (2); e13912. DOI: 10.1111/and.13912.
43. Gacci, M., M. Coppi, E. Baldi, et al. Semen impairment and occurrence of SARS-CoV-2 virus in semen after recovery from COVID-19. *Hum Reprod*, 2021; 36 (6); 1520-1529. DOI: 10.1093/humrep/deab026.
44. Li, H., X. Xiao, J. Zhang, et al. Impaired spermatogenesis in COVID-19 patients. *EClinicalMedicine*, 2020; 28; 100604. DOI: 10.1016/j.eclinm.2020.100604.
45. Hajizadeh Maleki, B. and B. Tartibian. COVID-19 and male reproductive function: a prospective, longitudinal cohort study. *Reproduction*, 2021; 161 (3); 319-331. DOI: 10.1530/REP-20-0382.
46. Li, K., G. Chen, H. Hou, et al. Analysis of sex hormones and menstruation in COVID-19 women of child-bearing age. *Reprod Biomed Online*, 2021; 42 (1); 260-267. DOI: 10.1016/j.rbmo.2020.09.020.
47. Mahdian, S., M. Shahhoseini and A. Moini. COVID-19 Mediated by Basigin Can Affect Male and Female Fertility. *Int J Fertil Steril*, 2020; 14 (3); 262-263. DOI: 10.22074/ijfs.2020.134702.
48. Jing, Y., L. Run-Qian, W. Hao-Ran, et al. Potential influence of COVID-19/ACE2 on the female reproductive system. *Mol Hum Reprod*, 2020; 26 (6); 367-373. DOI: 10.1093/molehr/gaaa030.
49. Henarejos-Castillo, I., P. Sebastian-Leon, A. Devesa-Peiro, et al. SARS-CoV-2 infection risk assessment in the endometrium: viral infection-related gene expression across the menstrual cycle. *Fertil Steril*, 2020; 114 (2); 223-232. DOI: 10.1016/j.fertnstert.2020.06.026.
50. Ding, T., T. Wang, J. Zhang, et al. Analysis of Ovarian Injury Associated With COVID-19 Disease in Reproductive-Aged Women in Wuhan, China: An Observational Study. *Front Med (Lausanne)*, 2021; 8; 635255. DOI: 10.3389/fmed.2021.635255.