

EDITORIAL

The Relationship between Epigenetics and Lifestyle in Homosexuality

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Homosexuality is a pattern of sexuality in which sexual behavior and thinking are directed towards people of the same sex. Although the Ibrahamic religions of Islam, Christianity, and Judaism prohibit homosexuality and teach that such behavior is sinful, male homosexuality, in particular, has been reported in many different cultures and historical eras. Lut¹ (Alayhi As-Salam [AS]), nephew of the Prophet Ibrahim² (AS), was sent as a prophet to the cities of Sodom and Gomorrah in the 22nd-20th centuries before Christ. Male homosexuality was very common in the tribe to which Lut (AS) was sent as a prophet. Lut (AS) conveyed the commands of Allah to people in order to make them give up homosexuality and make them follow him. Because the people continued their bad habits despite all the warnings of Lut (AS), Allah sent down torment on them. Allah turned (the cities) upside down, and rained down on them brimstones hard as baked clay, spread, layer on layer^{1,3}. To the best of our knowledge, this is the first documented report of homosexuality in human history.

Epigenetics is the study of how the environment and other factors can change the way that genes are expressed. While epigenetic changes do not alter the sequence of a person's genetic code, they can play an important role in development⁴. The lifestyle of a particular person or group of people is the living conditions, behavior, and habits that are typical of them or are chosen by them⁵. Here we discussed the relationship between epigenetics and lifestyle in homosexuality and presented some Islamic lifestyle factors that may prevent the development of homosexual thinking and behavior.

Epigenetic regulation mechanisms, including covalent chemical modifications of DNA and histones, along with the production of noncoding RNAs, allow the stable regulation of gene expression and function induced by environmental factors without changing DNA sequence⁶. Increasing evidence shows that environmental and lifestyle factors including nutrition, behavior, stress, physical activity, working habits, smoking and alcohol consumption may influence epigenetic mechanisms, such as DNA methylation, histone acetylation and microRNA expression⁷. There are some evidences about the role of epigenetic mechanisms in mediating lifestyle or environmental exposure effects on human health, considering the entire life-course, from in-utero to adulthood⁸. Many researchers increasingly believe that environmental effects are translated into biological consequences through epigenetic mechanisms⁹.

Sex differences in brain and behavior of humans result from an interaction between biological and environmental influences. Differential interactions with parents have additionally long-term influences on behavior. Sexual differentiation is mediated by early actions of sex steroids, more direct actions of sex-specific genes not mediated by gonadal sex steroids and epigenetic mechanisms¹⁰. Several hypotheses regarding potential social influences on sexual orientation have a long history of social and scientific controversy. These include the following ideas: that homosexuality can be caused by "recruitment," or the sexual seduction of a younger, sexually naive person by an older homosexual person; that the children of nonheterosexual parents have increased rates of nonheterosexuality due to social influences; and that psychotherapy can change homosexuality¹¹. Abé et al¹² reported that multivariate neuroanatomical correlates of same-sex sexual behavior, and tentatively suggests that genetic factors related to same-sex sexual behavior may contribute to structural variation in certain brain structures. These findings support a neurobiological basis to the differences in human

sexuality¹².

The molecular mechanisms of sexual orientation remain highly controversial and modulated by hormonal, genetic, maternal immune system, and environmental factors⁶. Current studies have emphasized the important role of prenatal, non-social environments in sexual orientation. Environmental factors exert influence on sexual orientation, possibly through interaction with prenatal endocrine effects. Environmental factors, such as prenatal exposure to stress, can lead to irreversible changes in the sexual behavior of offspring by altering the levels of testosterone⁶. The maternal embryonic environment also modifies the incidence of male homosexuality via immunological mechanisms¹⁰. Also, epigenetic mechanisms that specifically affect the X chromosome have been implicated in sexual orientation⁹. It is likely that genes involved in homosexuality may exert only modest effects, and that the development of homosexuality involves multiple genes, loci, and environmental factors and their interactions⁶. Jordan¹³ noted that while modest heritability for homosexuality is confirmed, no major locus is found and the genetic influence appears extremely polygenic. Thus, there is no single gene, or even small set of genes, that have a strong influence on homosexuality¹³.

Ganna et al¹⁴ performed a genome-wide association study on 477,522 individuals, revealing five loci significantly associated with same-sex sexual behavior. In aggregate, all tested genetic variants accounted for 8 to 25% of variation in same-sex sexual behavior, only partially overlapped between males and females, and do not allow meaningful prediction of an individual's sexual behavior¹⁴. Diamond¹⁵ noted that we should use Ganna et al.'s¹⁴ findings as a springboard for considering how the dynamic interaction between genetic and environmental factors gives rise to sexual and gender diversity. Perhaps most important, assessing how such gene/environment interactions shape the life experiences of sexually-diverse individuals, including their mental and physical health and their susceptibility to social stress and marginalization, offers important possibilities for fostering human flourishing across the entire spectrum of sexual expression¹⁵.

The development of homosexual thinking and behavior can be prevented by avoiding certain lifestyle factors. Islam prohibits lifestyles that may lead to the development of homosexual thoughts and behavior as follows: In Islam, it is haram (unlawful) for a man to expose his intimate (awrah) parts, which is the part between the navel and the knees. It is also not appropriate for a man to wear tight clothing that shows his awrah parts. The Prophet Muhammad (Sallallahu Alayhi Wa Sallam [SAW]) said that a man is not to look at the awrah of a man, and a woman is not to look at the awrah of a woman. A man is not to be alone with a man under one garment, and a woman is not to be alone with a woman under one garment¹⁶. Second, the Prophet Muhammad (SAW) forbade the gold and wearing of silk, yellow and red clothes for men, not for women¹⁷.

Women are always inclined to adornment. They need to be adorned because they want to be liked and accepted. Yellow and red colored clothes are fancy and flashy and suit more women. Silk and gold are among the most valuable ornaments. While women can use them, they are prohibited to men. A man looks like a woman when he wears yellow, red or silk clothes and wears gold. Men should not look like women. Also, boys who have not reached puberty cannot wear girls' clothes and cannot benefit from silk dresses¹⁸. The Prophet Muhammad (SAW) cursed a man who puts on the dress of women, and a woman who puts on the dress of men¹⁹.

In conclusion, we would like to emphasize that there is a

close relationship between epigenetics and lifestyle, and that positive or negative lifestyle factors can cause deregulation of epigenetic mechanisms that can cause changes in the structure and stability of the genome. Second, we think that lifestyle contributes to the development of homosexuality, and that homosexual thoughts and behaviors can be prevented if certain lifestyle factors are avoided, especially during pregnancy and the first 6 years of life, when brain development is fastest. Lastly, since both epigenetic mechanisms and lifestyle are modifiable, we recommend conducting comprehensive multicenter studies involving different cultures on the relationship between epigenetics and lifestyle in homosexuality.

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