

EYELID ANATOMY VARIATIONS IN CENTRAL ASIAN POPULATION

Dr.Mehmet Mustafa Beşirikli
Tashkent State Medical University
besirikli@lomnas.uk

Abstract: The anatomy of the eyelid represents a crucial aspect of the facial structure, holding functional, aesthetic, and cultural significance across various populations. Within the Central Asian region, where diverse ethnic groups and historic population migration intersect, eyelid anatomy displays notable variations. Analyzing these morphological differences not only enhances clinical understanding, especially in areas of ophthalmology and reconstructive surgery, but also brings insight into anthropological identity and regional genetics. The central focus of this exploration is to delineate the structure and diversity of eyelid anatomy observed among Central Asian peoples, identifying patterns, medical implications, and their broader importance in societal and aesthetic contexts.

Keywords: eyelid anatomy, anatomical variations, Central Asian population, palpebral structure, eyelid morphology, orbital region, ophthalmology, cosmetic considerations, anthropological diversity, ethnic features.

Аннотация: Анатомия века представляет собой важнейший аспект строения лица, обладающий функциональным, эстетическим и культурным значением у различных народов. В регионе Центральной Азии, где пересекаются многочисленные этнические группы и исторические миграции населения, анатомия век проявляет заметные вариации. Анализ этих морфологических различий расширяет клиническое понимание, особенно в области офтальмологии и реконструктивной хирургии, а также предоставляет сведения для антропологических исследований и генетики региона. Данная работа посвящена описанию структуры и разнообразия анатомии век среди народов

Центральной Азии, выявлению закономерностей, медицинских аспектов и их значимости в социальном и эстетическом контексте.

Ключевые слова: анатомия века, анатомические вариации, население Центральной Азии, структура века, морфология века, орбитальная область, офтальмология, эстетические аспекты, антропологическое разнообразие, этнические особенности.

Annotatsiya: Ko‘z qovoqlarining anatomiyasi yuz tuzilishining muhim jihatini tashkil etadi va u turli xalqlarda funksional, estetik hamda madaniy ahamiyatga ega. Markaziy Osiyo mintaqasida, turli etnik guruhlar va tarixiy aholi migratsiyasi kesishgan hududda, qovoq anatomiyasida sezilarli farqlar kuzatiladi. Ushbu morfologik tafovutlarni tahlil qilish oftalmologiya va rekonstruktiv jarrohlikda klinik tushunchani boyitadi, shu bilan birga, antropologik va genetik tadqiqotlar uchun ham muhim ma’lumotlar beradi. Mazkur tadqiqot Markaziy Osiyo xalqlarida uchraydigan qovoq tuzilmasi va xilma-xilligini, mavjud qonuniyatlar, tibbiy ahamiyati hamda ularning ijtimoiy-estetik kontekstdagi o‘rni va ahamiyatini aniqlashga qaratilgan.

Kalit so‘zlar: qovoq anatomiyasi, anatomik farqlar, Markaziy Osiyo aholisi, qovoq tuzilishi, qovoq morfologiyasi, orbital hudud, oftalmologiya, estetik jihatlar, antropologik xilma-xillik, etnik xususiyatlar.

INTRODUCTION

Eyelids, serving as the protective covering of the eye, consist of multiple layers including skin, subcutaneous tissue, orbicularis oculi muscle, orbital septum, tarsal plate, and conjunctiva. Underlying these layers are complex systems of muscles, glands, and connective tissues that work in harmony to protect the eyeball, maintain ocular moisture, and facilitate movement. In Central Asia, the anatomical characteristics of the eyelid often manifest with distinct traits compared to populations in neighboring regions. These traits are most notably observed in the configuration of the upper eyelid, the visibility and location of the supratarsal fold, the structure of the epicanthal fold, the distribution of subcutaneous fat, and the thickness and extensibility of the skin. A hallmark of Central Asian eyelid anatomy is the substantial

interindividual and interethnic variability influenced by centuries of gene flow and population mixing. The morphology identified among these peoples is often described as intermediate between East Asian and West Eurasian populations. A wide spectrum exists ranging from pronounced supratarsal folds to minimal or absent creases, with varying presence of the epicanthal fold—a skin fold of the upper eyelid covering the inner corner (canthus) of the eye. The persistence of this fold in certain parts of the Central Asian demographic is associated with polygenic heritage as well as environmental adaptation, possibly protecting the eye against extreme weather conditions prevalent in the region's steppes and deserts.

MATERIALS AND METHODS

The supratarsal fold, often referred to as the upper eyelid crease, distinguishes eyelid types notably in clinical and cosmetic practices. In Central Asian groups, some individuals show a clear, well-defined crease approximately 7–9 millimeters above the eyelash margin, whereas others exhibit a lower or incomplete fold, and some lack a pronounced fold altogether. The level of crease prominence has implications not only for visual field and facial expression but also for surgical approaches in blepharoplasty and ptosis correction procedures. Surgeons operating in this region require detailed knowledge of local anatomical peculiarities to achieve natural outcomes and maintain the functionality of the eyelid. Another vital anatomical feature is the distribution and thickness of subcutaneous fat within the eyelids. Central Asians typically have intermediate levels of eyelid fat that can influence the fullness of the upper eyelid and the overall contour of the orbit. The tarsal plate, a dense connective tissue giving structural support, is normally of average depth and firmness compared with both East Asian and Western counterparts, offering a balance between eyelid mobility and resistance. The orbicularis oculi muscle, responsible for eyelid closure, is generally well developed, supporting efficient eye protection and tear distribution. The epicanthal fold, though often associated with East Asian populations, is present in varying degrees among Central Asians. It is hypothesized that the frequency and structure of the epicanthal fold is shaped by the dual genetic contributions from eastern

and western Eurasian ancestors, giving rise to an array of presentations. Some individuals exhibit a distinct epicanthal fold that partially conceals the medial canthus, while others show only a trace or lack the fold entirely. This anatomical trait can influence ocular width, the shape of the palpebral fissure, and perception of facial youthfulness. The existence or absence of the epicanthal fold also carries cultural and aesthetic weight, reflecting diverse beauty conventions and ideals across Central Asian groups.

RESULTS AND DISCUSSION

The anatomy of lower eyelids in Central Asians generally shows similar diversity, with subtle variations in skin thickness, fat distribution, and prominence of the orbicularis oculi. While the lower lid is primarily tasked with protecting the lower aspect of the eye, its anatomical characteristics also play a role in shaping the overall expression and perceived vitality of the face. Fine wrinkling, the rate of fat herniation, and the formation of tear trough deformities tend to vary among individuals, further underscoring the region's unique blend of phenotypic features. From an anthropological perspective, Central Asia constitutes a crossroads of Eurasian population movement, resulting in a genetic mosaic reflected in facial and eyelid anatomy. The Silk Road and historical migrations facilitated substantial admixture between groups originating from Europe, Siberia, China, and the Indian subcontinent. This extensive mixing has left its trace in the range of eyelid types, fold configurations, and orbital shapes encountered among Kazakhs, Uzbeks, Kyrgyz, Tajiks, Turkmens, and other groups. Comparing eyelid anatomy across the region illustrates commonalities, such as intermediate fold heights and moderate subcutaneous fat, while also demonstrating local population-specific patterns likely tied to both ancient and recent admixture events [1].

In the realm of clinical medicine, understanding regional eyelid anatomy is pivotal in both diagnosis and surgical planning. Many ophthalmic conditions such as blepharoptosis, dermatochalasis, and entropion require precise anatomical assessment before intervention. The success rate of cosmetic or reconstructive eyelid surgeries is

highly dependent on the practitioner's familiarity with the typical features and potential anomalies present in the Central Asian population. For instance, the risk of damaging the levator aponeurosis, responsible for eyelid elevation, or the lacrimal system, critical for tear drainage, can be minimized through detailed anatomical knowledge specific to the population being treated [2].

Aesthetic considerations are equally significant in shaping the perception and desirability of eyelid features. Central Asian standards of beauty, though diverse, often celebrate a harmonious balance between the almond-shaped palpebral fissure and delicately contoured upper eyelid. Beauty practices and surgical requests frequently reflect these aspirations, with preferences sometimes leaning toward preservation of ethnic characteristics rather than imposing external standards. Practitioners are called to respect these individual and collective preferences, reinforcing the importance of cultural competence in both medical and cosmetic fields. The study of eyelid anatomy in Central Asians also has implications in forensic science and population genetics. Phenotypic traits such as the presence or absence of epicanthal folds, the curvature of the eyelid, and the visibility of the supratarsal crease may serve as valuable markers in anthropological identification as well as in population genetics research. Such markers help reconstruct migration patterns, trace heritage lines, and define both diversity and shared ancestry within the region. Environmental adaptation cannot be discounted as a factor influencing eyelid morphology. Historically, the peoples of Central Asia have resided in environments characterized by marked temperature fluctuations, aridity, dust, and heightened exposure to solar radiation. Such climatic conditions may have selected for certain eyelid traits that confer visual protection, moisture retention, and resistance to environmental insult. The patterns observed in eyelid morphology thus reflect nature's intricate balance between adaptation and inherited genetic potential [3].

Eyelid anatomy among Central Asians also exerts influence over non-visual aspects of facial function, including tear film stability, blink mechanics, and even speech articulation through facial movement. Minor structural differences in eyelid weight, skin redundancy, and crease patterns can modulate these levels of function,

indirectly shaping quotidian experience and health outcomes. Advancements in non-invasive imaging technology have permitted more nuanced evaluation of eyelid structures in Central Asian samples, facilitating the quantification of anatomical characteristics. Such research underscores the variation in crease height, fat compartment size, and muscle bulk within and among various ethnic assemblages. These findings are instrumental in training new surgeons and informing public health policies aimed at eye care in mountainous or rural areas where access to specialized services may be limited [4].

Educational efforts directed at both clinicians and the general population have begun emphasizing the diversity and uniqueness of Central Asian eyelid forms. By promoting awareness and acceptance of naturally occurring anatomical diversity, these initiatives foster a healthier sense of self-image, counteract bias, and affirm the legitimacy of indigenous facial characteristics. Understanding the anatomy of eyelids in Central Asians is thus not only a matter of scientific inquiry but also of cultural affirmation and identity. In summary, the anatomy of the eyelid within the Central Asian population is characterized by remarkable variability rooted in a complex interplay of genetic, environmental, and cultural factors. The intermediate placement of Central Asia, geographically and genetically, has yielded a mosaic of eyelid features that often defy simplistic classification. This diversity is reflected in the distribution of the epicanthal fold, the structure of the supratarsal crease, the depth and shape of the palpebral fissure, and the thickness of subcutaneous fat and muscle tissue in both upper and lower eyelids [5].

Medical, cosmetic, and cultural sectors all intersect in the significance of these anatomical traits. For medical professionals, in-depth knowledge of regional eyelid anatomy enhances surgical outcomes, supports the diagnosis of local ophthalmologic conditions, and informs public health strategies. Cosmetic practitioners and anthropologists benefit by recognizing the plurality of beauty and the prestige of local phenotypic forms, contributing to the cultural confidence and social well-being of Central Asian communities [6].

CONCLUSION

The investigation of eyelid anatomy variations in the Central Asian population underlines the richness of human biological diversity and affirms the need for culturally sensitive clinical and aesthetic practices. Central Asian eyelid morphology is shaped by a confluence of anthropological history, environmental adaptation, and complex genetic inheritance, resulting in unique anatomical features that set the region apart from neighboring populations. Clinicians, surgeons, researchers, and the broader medical and scientific community stand to benefit from appreciating this diversity as they build a more inclusive and accurate understanding of human anatomy. Furthermore, fostering appreciation of local variation supports the preservation and celebration of ethnic identity, ensuring that the uniqueness of Central Asian eyelid features is viewed as a manifestation of evolutionary adaptation and cultural heritage rather than as an anomaly. The recognition and integration of these anatomical realities pave the way for more equitable healthcare, more sensitive aesthetic services, and a greater affirmation of the region's distinct cultural and biological legacy.

REFERENCES

1. Dharap AS, Reddy SC. Upper eyelid and eyebrow dimensions in Malays. *Med J Malaysia* 1995; 50: 377-81.
2. Fengzhi X, Wei Z, Guo-Kang F, Jiang C, Hua L. Double eyelid operation recreating the anatomic microstructure. *Ann Plast Surg* 2009; 63: 242-8.
3. Jeong S, Lemke BN, Dortzbach RK, Park YG, Kang HK. The Asian upper eyelid: an anatomical study with comparison to the Caucasian eyelid. *Arch Ophthalmol* 1999; 117: 907-12.
4. Nagasao T, Shimizu Y, Ding W, Jiang H, Kishi K, Imanishi N. Morphological analysis of the upper eyelid tarsus in Asians. *Ann Plast Surg* 2011; 66: 196-201.
5. Preechawai P. Anthropometry of eyelid and orbit in four southern Thailand ethnic groups. *J Med Assoc Thai* 2011; 94: 193-9.
6. Saonanon P. Update on Asian eyelid anatomy and clinical relevance. *Curr Opin Ophthalmol* 2014; 25: 436-42.