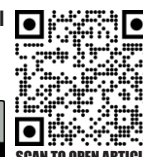


Amblyopia Screening in Pakistan: A Public Health Review and Policy Perspective

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ABSTRACT

Amblyopia or “lazy eye” is a major cause of preventable eyesight deficit ailment in children aged 1-5 and accounting for 2-5% of the children's population world over¹. In Pakistan, where children under the age of 15 amount to 40% of the whole population², it is largely inflated by the absence of reliable data and national screening programmes. Vision screening is vital at this stage because it is during this age when symptoms can be identified. A study found that self-perception of social acceptance was lower in children treated for amblyopia compared with age-matched controls.³

This article addresses issues and possibilities of commencing amblyopia screening programmes in Pakistan using successful models from foreign countries. Insufficient health care facilities and budgetary restrictions cripple the public healthcare system in Pakistan. However, recent advancements in amblyopia treatment including binocular therapy and pharmacological alternatives to traditional patching could enhance outcomes in low-resource settings like Pakistan.⁴ With these measures in place, Pakistan's growing rate of amblyopia will be controllable, and children's visual health will positively develop.

THE EPIDEMIOLOGY OF AMBLYOPIA IN PAKISTAN

The primary visual cortex exhibits peak neuroplasticity during early childhood (birth to age 7), making this period crucial for treating amblyopia and that is precisely why delayed interventions are less effective, advocating for early screening to capitalize on the brain's capacity for visual system rewiring.⁵ Amblyopia is generally classified as follows: strabismic (misalignment of the visual axis), refractive, anisometropia (difference in refraction of the two eyes), isoametropic (bilateral high refractive error), visual deprivation (media opacity, ptosis, etc.), and occlusion.⁶ types. Sadly, in Pakistan there seems to

be a gap in knowledge and information regarding the treatments and prevalence of amblyopia. Furthermore, there is a significant amount of screening which remains to be done at the country level. The precise prevalence remains unknown because the data is piecemeal and fragmented but in an unpublished data from Al-Shifa Community Ophthalmology Department, Rawalpindi, Pakistan, out of 250,000 school children who were screened for ophthalmic problems from 1992 to 1994, 0.3% were found to have amblyopia. Further highlighting the lack of comprehensive national data, our recent screening of 75 primary school children in Kharian Cantonment, Pakistan, revealed an amblyopia prevalence of 41.3% (31 out of 75 children).

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Notably, the prevalence among girls was significantly higher at 71.4% (15 out of 21 girls) compared to boys at 29.6% (16 out of 54 boys). Ethical approval for this screening study was obtained from CMH Kharian Medical College Institutional Ethical Review Board, reference number: [ERB No: RES03/15JUN22].

These are further made worse by cultural issues, such as delaying going to get treatment and not understanding the difficulty in seeing problems.⁷ Forgoing treatment at an earlier stage of amblyopia results in the worst-case scenario which is permanent loss of vision which consequently leads to poor academic performance, unemployment, mental issues and reduced quality of life.⁸

If not treated, children suffering from amblyopia may struggle with social interactions, academics, and other personal activities both in the present and the future. In their later years, these issues can have a detrimental impact on their overall quality of life. This research sought to determine the prevalence of amblyopia in primary school aged children using screening techniques.

CURRENT CHALLENGES IN AMBLYOPIA SCREENING

Despite technological progress in pediatric vision screening, its effectiveness is undermined by high false-positive rates from automated devices pediatricians report such rates significantly reduce confidence in screening outcomes and lead to fewer referrals for ambulatory eye care.⁹ Pakistan's attempts to put in place comprehensive screening for amblyopia have been stalled by powerful infrastructural, policy, sociocultural, and economic systemic barriers. The root causes of this problem can be found in the country's healthcare infrastructure being deficient as there is a critical lack of eye care practitioners. The shortfall is especially severe in rural regions, where sixty percent of the Pakistani population lives. According to the International Council of Ophthalmology, there are 1860 ophthalmologists in Pakistan with 11 ophthalmologists per million of the population.¹⁰

The lack of unified national screening protocols makes these structural gaps even worse. Pakistan does not have coordinated national standards, unlike the UK's mandatory preschool screening program.¹¹ This gap in policy has resulted in fragmented initiatives that rely on NGOs, which do not provide adequate coverage for at-risk children and lack proper follow-up care. The overall state of healthcare in this country exemplifies a more pronounced systematic lack of concern regarding children's vision care within the country's public health policies.

Equally challenging are the pervasive sociocultural misconceptions that reduce the effectiveness of the screening. In a study from 2006, it was found that a lot of people in Pakistan believe that the use of kohl, medicines and eye drops (unprescribed) keeps eyes healthy whereas these actually damage the eyes progressively.¹² For instance, in Rawalpindi, Pakistan, a study found that 59% of school-going children did not comply with wearing spectacles. Notably, a higher proportion of girls (42%) were non-compliant compared to boys (16%). The reasons of non-compliance include broken (16%), forgot at home (13%), lost (9%), peer pressure (19%), don't like spectacles (28%) and poor financial conditions (15%).¹³ Most of these attitudes prolong time to the first presentation to care, with numerous cases only diagnosed during elementary school vision check-ups, which happens too late to be effective.

Such economical barriers create additional gaps within an already difficult terrain. Approximately 39.4 percent of Pakistanis live under the poverty line in the year 2023, as estimated by the world bank¹⁴. Thus, even the average costs of refraction tests which are five hundred PKR and basic spectacles that range from 1,500 to 3,000 PKR attempts to be within reach, but is still prohibitive. The aforementioned financial pressure is further aggravated by the disproportionate amount of eye care facilities within urban centers. This forces rural families to pay hefty travel fees which leads these families to becoming reluctant towards returning for follow up visits. Some families result in an

astounding 60 percent attrition rate for some screening to treatment cascades.

All of these problems – deficits in economic barriers, policy issues, cultural barriers, gaps in infrastructure – work in tandem to lower the rate of amblyopia detection in Pakistan to less than twenty percent of the actual cases. The current condition presents a need for interventions which span across multiple sectors which do not solely deal with the immediate consequences of the failure of the system, but its real underlying issues. Should there be no accompanying changes that serve as a proxy for strong infrastructure, standardized procedures, public outreach, and funding schemes, able-bodied children suffering from vision impairment and consequences will continue to be the norm within Pakistan.

OPPORTUNITIES FOR IMPROVING AMBLYOPIA SCREENING IN PAKISTAN

A few of the screening techniques for amblyopia have the potential of being greatly improved to ensure better results throughout Pakistan. There is a potential economically viable solution to School-based screening programs because they capitalize on the current education systems to ensure maximum coverage; as we showed in our study, training teachers to implement simple vision screening procedures using the Snellen chart is simple and can easily be scaled. In some remote areas where school attendance may be difficult, the participation of community health workers (CHWs) may be very helpful, with CHWs performing door-to-door outreach and referring cases they suspect to be positive to the eye health care facilities.¹⁴ Several hundred community health workers offer telehealth services that put women in underserved communities in touch with doctors.¹⁶ In tandem with these strategies, the general public could be informed best by the press on the importance of early diagnosis while working to change some negative attitudes together with known medical practitioners and religious persons. Ultimately, policy advocacy support aimed at conducting maternal and child focused amblyopia

policy integration requires significant political action to transcend the existing barriers toward integration. Systematic policy change will also need to support existing child care services to incorporate vision screening. Collectively, these approaches have the potential to enhance Pakistan's capability for early identification and management of amblyopia.

INSIGHTS FROM GLOBAL MODELS

International experience shows that systematic methods can greatly reduce amblyopia prevalence. The UK and Australia have successful programs which each embody three aspects that Pakistan may use. First, early screening for amblyopia is more effective than late screening. A study in England reported reduction in amblyopia prevalence in children undergoing intensive screening before 37 months of age.¹⁶ This period captures children while they are in critical periods of development where treatment, during peak ocular growth periods, is most effective and can be administered. Second, Lady Health Workers (LHWs) should be trained especially for eye health assessment similar to a study in Tanzania where primary healthcare workers trained for eye health assessment showed increased level of knowledge and skill in conducting eye health assessment procedures.¹⁷ This guarantees that there is complete care regarding screening, diagnosis, and treatments follow-up. Third, there is a culturally sensitive educational material locally translated to bridge knowledge gaps and refocus family-centered care through attitudinal and parental-centered strategy in successful programs. For instance, a study aimed at improving early eye care for Hispanic children involved developing educational materials tailored to the cultural and linguistic needs of the community. This process included focus groups with Hispanic parents and consultations with health experts to ensure the materials were culturally appropriate and effectively addressed barriers to seeking eye care.¹⁸

For Pakistan, initiating these evidence-based strategies may commence with selected pilot

programs in high-burden areas such as Punjab and Sindh. These pilot programs should include: (1) adaptation of local screening procedures, (2) multidisciplinary education and training programs, and (3) region specific public awareness campaigns in local languages and cultural contexts. The data gathered from these pilots could then be used to argue in favor of reform-and enlargement policy adoption. Also, Pakistan could improve these models by using them with school health programs and the Lady Health Worker program, which would make these models cheaper and more sustainable. Incorporating local context into the global best practices, Pakistan will be able to build an amblyopia screening model that meets the needs of the country and achieves the outcomes other countries do.

THE ECONOMIC AND SOCIAL IMPACT OF EARLY AMBLYOPIA DETECTION IN PAKISTAN

The incorporation of amblyopia screening programs in Pakistan would be beneficial in many ways. From an economic standpoint, visual impairment, which appears to be a bigger problem in the country, from a healthcare perspective is rather easy to fix. Preliminary treatment methods, such as corrective glasses or atropine drops, are affordable, costing substantially less than managing the impairment over an individual's lifetime. A study in Risk Management and Healthcare Policy estimated the cost of glasses for a five-year period for amblyopia to be much less than the QALY cost it provided the patient.¹⁹ This saves a lot for the healthcare system in Pakistan. These are important in alleviating the poverty cycle. At the end of the cycle, prompt treatment of children aids greatly. There is enhanced quality of life as evident by their increased social integration and self-esteem. These combined benefits - decrease in healthcare expenditures, better educational opportunities, and social wellbeing - indicate that screening for amblyopia is one of the best healthcare investments in Pakistan. The cost of implementing these programs is rather low as compared to the huge benefits of having a healthier and more productive

society in the future. This makes early detection a socio-economic strategy and an issue that needs medical attention.

CONCLUSION

Up to 80% of childhood visual impairment is preventable or treatable with timely intervention.²⁰ Not only is the identification of amblyopia in Pakistan an issue that must be addressed medically, but also sociologically. Although there are challenges such as lack of resources or low levels of awareness, there are solutions that can be implemented on a wide scale. Applying policy initiatives, community-based mobilization, and school-centered screening programs will avert irrevocable loss of vision for thousands of children in Pakistan. Our study's model of "screening-only" offers a practical approach in this regard. This vision cannot be realized without cooperation from the government, non-government organizations, and international agencies. We urge policymakers to prioritize amblyopia screening in the next national child health framework.

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