DOI:10.14744/bej.2025.02170
Beyoglu Eye J 2025; 10(2): 85-94

Original Article

A Meta-Analysis and Meta-Regression of Pediatric Open Globe Injuries in Türkiye

Kursat Atalay,[1] Havva Kaldirim Erdogan,[1] Fatma Gezer Savur,[1] Levent Dogan,[2] Kursad Ramazan Zor,[2] Ali Turker Ciftci[3]

[1]Department of Ophthalmology, Basaksehir Cam and Sakura City Hospital, İstanbul, Türkiye
[2]Department of Ophthalmology, Nigde Omer Halisdemir University, Niğde, Türkiye
[3]Department of Biostatistics and Medical Informatics, Mersin University, Mersin, Türkiye

Abstract

Objectives: To do a meta-analysis of pediatric open globe injuries (OGI) presented from Türkiye for the 5 years up to June 2023.

Methods: We used the Preferred Reporting Items for Systematic Reviews and Meta-analyses Statement and the Meta-analysis of Observational Studies in Epidemiology criteria. We included studies that analyzed individuals younger than 18 years without age and follow-up period restrictions. We performed random-effects model estimates for the meta-analysis of the relevant studies. We evaluated the heterogeneity with the inconsistency index I2 and the Q-test.

Results: The average age of child injuries was 7.4 (95% confidence interval [CI]: 6.9–8.5) years. While the injury rate in boys was 66.8% (95% CI: 61.8–71.4), it was observed as 33.2% (95% CI: 28.6–38.2) in girls. Home injuries were the highest with 46.9% (95% CI: 22.4–73.1). Sharp-pointed object traumas were the most common, accounting for 71.9% (95% CI: 58.3–82.4). When the trauma zone distribution was examined, it was determined as zone 1 with the highest rate of 63.8% (95% CI: 60.1–67.3). Zone 2 and zone 3 have been observed with decreasing frequency (25.4% and 105%, respectively). The overall effect size of boys was positive in the group whose final best-corrected visual acuity (BCVA) was no light perception (β: 1.1657; p=0.0039). For patients with a final BCVA <0.1, Trauma Zone 1 (β: −0.0054; p=0.0410) and Zone 2 (β: −0.0034; p=0.0211) were found to have a negative overall effect size.

Conclusion: OGI is one of the important health problems. We think that standardized research will contribute to the enlightenment of this issue.

Keywords: Child, eye trauma, open globe injury, pediatric, Türkiye

Introduction

Childhood blindness remains one of the most important health problems of children, and ocular trauma is a potentially avoidable part of this problem (1,2). Approximately 19 million people are diagnosed with unilateral visual loss, and nearly 1.7 million people suffer from bilateral blindness due to ocular trauma (1). Almost 250000 children present with serious ocular trauma (3). Up to 14% of childhood ocular injuries result in decreased vision or blindness (4,5).

Socioeconomic status, education, and nature of work are important factors in the pathogenesis of ocular trauma, but the epidemiology of ocular injury varies largely in different

How to cite this article: Atalay K, Kaldirim Erdogan H, Gezer Savur F, Dogan L, Zor KR, Ciftci AT. A Meta-Analysis and Meta-Regression of Pediatric Open Globe Injuries in Türkiye. Beyoglu Eye J 2025; 10(2): 85-94.

Address for correspondence: Levent Dogan, MD. Department of Ophthalmology, Nigde Omer Halisdemir University, Niğde, Türkiye
Phone: +90 538 685 22 32 **E-mail:** drleventdogan@gmail.com

Submitted Date: September 08, 2024 **Revised Date:** March 12, 2025 **Accepted Date:** April 13, 2025 **Available Online Date:** June 25, 2025

Beyoglu Eye Training and Research Hospital - Available online at www.beyoglueye.com

regions and between the populations (6-8). According to many studies published before in Türkiye, open globe injury (OGI) constitutes an important health problem in the childhood age group. Thus, to define some characteristics of OGI of children, we presented a meta-analysis and meta-regression of studies presented from Türkiye for the 10 years up to June 2023 in this study.

Methods

This study was conducted in accordance with the Declaration of Helsinki. Approval for our research was obtained from the local ethics committee (Approval number: 2019.03.2.01.025). We used the preferred reporting items for Systematic Reviews and Meta-Analyses statement (PRISMA) and Meta-analysis of Observational Studies in Epidemiology criteria in the design and preparation of our meta-analysis (9,10).

To carry out this research, we searched for the words "child," "childhood," "pediatric," "eye trauma," "eye injury," "open eye injury," "open eye trauma," "open globe injury," "open eye injury," "globe trauma," "Türkiye" keywords (and Turkish equivalents of these words) in PubMed, Science Direct, and Ulakbim-TRDizin (indexing agency of The Scientific And Technological Research Council of Türkiye-TUBITAK) indexes with the Boolean method. We examined studies published in English and Turkish literature and oral presentations published in congress booklets of the Turkish Ophthalmology Society, Türkiye Association of Emergency Medicine, Emergency Medicine Specialists Association up to June 2023, for 10 years. Thesis studies and congress poster presentations that have not been published in any refereed journal were not examined. Two independent investigators (KA, LD) checked the results first for the titles and summaries, then full-text articles that were selected from the electronic databases. In case of inconsistency in the selection or uncertain situations, it was decided by taking the opinion of another researcher (HK) whether the relevant article should be included in the study. Studies including individuals younger than 18 years without age and follow-up period restriction were included in the study. Studies with duplicated data were checked and if present, only one of these studies that met the inclusion criteria was included in this meta-analysis. We summarized the article selection process with a PRISMA flow chart in Figure 1.

The following data were extracted from published articles, and when necessary, from direct contact with the authors: Author, year, city, average age, sex, site of trauma (zone 1, zone 2, zone 3), type of penetrating injury, the agent causing injury, best-corrected visual acuity (BCVA) measurements at baseline and last visit. The zone of injury was categorized using the ocular trauma classification group system

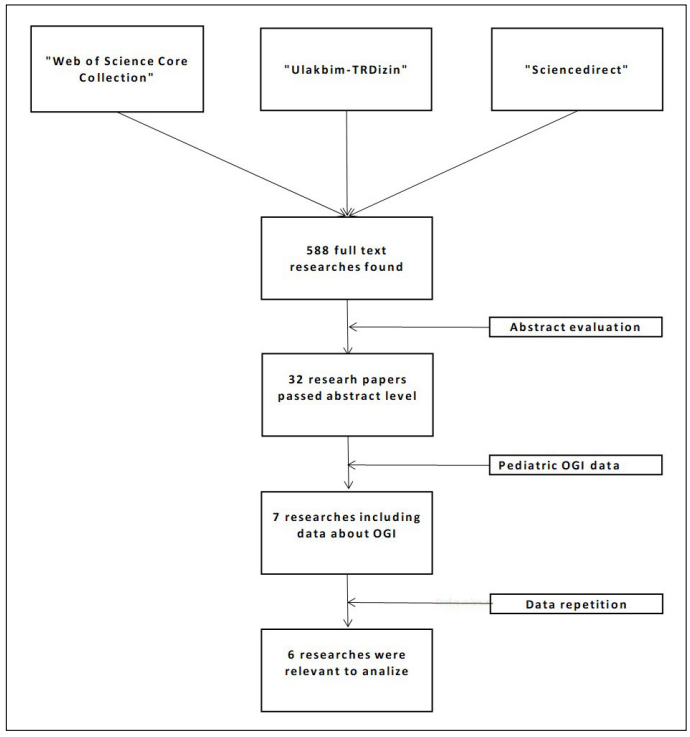

Figure 1. Preferred reporting items for systematic reviews and meta-analyses statement flow chart of the meta-analysis.

(11). In this system, Zone I signifies injuries confined solely to the cornea, including the corneoscleral limbus. Zone II encompasses full-thickness wounds involving the sclera, with a posterior limitation of 5 mm from the limbus. Zone III designates full-thickness wounds extending beyond 5 mm posterior to the sclera (11).

Statistical Analysis

We performed fixed-effects model and random-effects model estimates for meta-analysis of the relevant studies (12). We evaluated the heterogeneity with the inconsistency index I2 and the Q test. Statistical heterogeneity was demonstrated by a $p=0.05$ when analyzed with the Q test (13). Publication bias was tested with Egger's method and evaluated with funnel plots for graphical representation (14) (Fig. 2). We wanted to investigate the meta-regression of the articles examined in the study. The studies were evaluated individually for the meta-regression process. We considered a $p \leq 0.05$ for statistical significance. This study was conducted with the comprehensive meta-analysis (Biostat Inc; New Jersey, USA) and MedCalc (MedCalc Software Ltd; Acacialaan 22 8400 Ostend; Belgium) statistical software trial versions.

Results

The abstract analysis included 588 articles found after scanning databases and congress booklets. Thirty-three of these studies passed the abstract level and were subjected to full-text analysis. Twelve studies were discovered to include

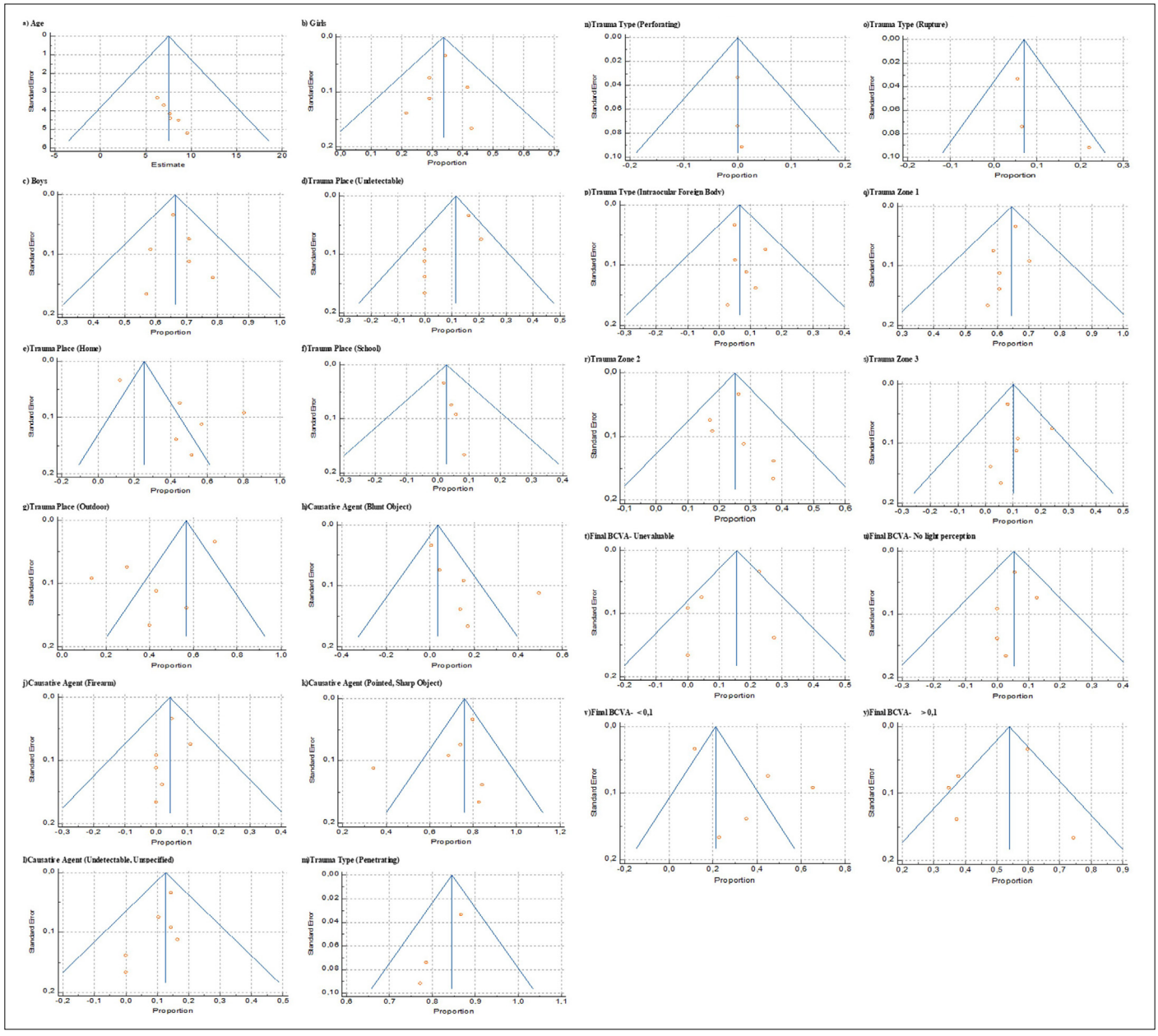

Figure 2. Funnel plot graphics of the data.

pediatric eye injuries. Seven of these studies were about penetrating eye injuries only six of them were included in the meta-analysis because one of them had repetitive data. Table 1 provides summary information about the studies. The Newcastle–Ottawa scale was used to score the articles in the study, and a quality assessment scale is shown in Table 2. Table 3 displays data on study heterogeneity using Egger's tests, I2 values, and Q test results. The extracted data from the evaluated studies are given as a supplementary file.

The average age for child injuries in the studies was 7.4 (95% confidence interval [CI]: 6.9–8.5) years. While boys were injured at a rate of 66.8% (95% CI: 61.8–71.4), girls were injured at a rate of 33.2% (95% CI: 28.6–38.2). When the location of the trauma is considered, it is discovered that home injuries are the most common, accounting for 46.9% of all injuries (95% CI: 22.4–73.1). Following that, outdoor was 40.8% (95% CI: 21.9–62.8), undetectable was 9.0% (95% CI: 4.5–17.2), and school was 4.2% (95% CI: 2.1–8.1). When the causative agent for trauma is investigated, it is discovered that sharp-pointed objects are the most common, accounting for 71.9% of all cases (95% CI: 58.3–82.4). As a continuation of trauma causes, undetectable-unspecified things 13.0% (95% CI: 9.8–17.0), blunt objects 9.8% (95% CI: 2.7–29.8), and firearms 4.0% (95% CI: (1.8–8.5) were observed in that order (Fig. 3).

Table 1. Summary of the studies about which type of data each containing

	Study period	Publishing date	Study aim	Age data	Sex of the patients	Trauma place	Causative agent	Trauma type	Trauma zone	Time interval to hospital admission	Baseline BCVA	Last visit BCVA
Sul et al. (21)	2000–2010	2015	To determine the clinical characteristics, visual and anatomical outcomes, and factors associated with poor visual and anatomical outcomes in OGI	Yes	Yes	Yes	Yes	Yes	Yes**	Yes	Yes	Yes
Batur et al. (20)	1996–2015	2017	To evaluate the epidemiology and outcomes of pediatric OGI in eastern Türkiye	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Gogus et al. (28)	2008-2012	2016	To evaluate the pediatric patients under 16 years old who applied due to open eyeball injury	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Karagoz et al. (29)	2000–2011	2018	To evaluate 1-year follow-up results of cases diagnosed with OGI, to compare trauma-related characteristics between pediatric and adult cases, and to assess risk factors that influence final visual acuity.	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Kivanc et al. (27)	2010–2013	2016	To define age, as a parameter for open globe injuries	Yes	Yes	Yes	Yes	No	Yes	Yes	No	No
Bozali et al. (26)	2009–2021	2022	To evaluate the epidemiologic and clinical features of pediatric OGI	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes

OGI: Open globe injury; BCVA: Best corrected visual acuity; **The OGI location was described in the article and we connected to authors to clarify.

Table 2. Newcastle-Ottowa quality assessment scale of the articles

Study	Selection				Comparibility	Outcome			Quality score
	Representativeness of the exposed cohort	Selection of the non exposed cohort	Ascertainment of exposure	Demonstration that outcome of interest was not present at start of study	Comparability of cohorts on the basis of the design or analysis	Assessment of outcome	Was follow-up long enough for outcomes to occur	Adequacy of follow up of cohorts	
Sul et al. (21)	*	*	*	*	**	*	*	*	9
Batur et al. (20)	*	*	*	*	**	*	*	*	9
Gogus et al. (28)	*	*	*	*	*	*	*	*	8
Karagoz et al. (29)	*	*	*	*	**	*	*	*	9
Kivanc et al. (27)	*	*	*	*	*	*	*		7
Bozali et al. (26)	*	*	*	*	*	*	*	*	8

When examined as a type of OGI, it stands out as the most penetrating with 81.6% (95% CI: 73.6–87.6). Rupture type was observed to be 9.5% (95% CI: 3.6–22.8), intraocular foreign body was observed to be 7.8% (95% CI: 4.5–13.2), and finally, 0.3% (95% CI: 0.01–1.3) was observed to be perforating. When the zone distribution of trauma in the studies was examined, Trauma zone 1 had the highest rate of 63.8% (95% CI: 60.1–67.3). Trauma zones 2 and 3 have been identified with decreasing frequency (25.4% [95% CI: 20.1–31.6] and 10.5% [95% CI: 5.8–18.3], respectively).

In terms of time until hospital admission, those who applied to the hospital within 24 h of OGI were found to be more likely, with a value of 85.4% (95% CI: 77.9–90.7). As a continuation of this, it was found to be 12.0% (95% CI: 8.7–16.2) between 24 and 48 h, and 2.4% after 48 h (95% CI: 6.1–8.8). When the baseline BCVA values were examined, patients with a score of 20/200 had the highest percentage, 51.6% (95% CI: 15.7–85.9). Following that, the BCVA> 20/200, not evaluated, and no light perception (NLP) groups were observed to be in descending order. Among the final BCVA groups, the group with final BCVA >0.1 had the highest distribution (48.2% [95% CI: 34.3–62.5]). BCVA <0.1, NLP, and not evaluated groups were observed in decreasing levels.

Sensitivity analysis was applied by removing large studies to assess their impact. It was observed that the removed studies did not significantly affect the results. Meta-regression data are given in Table 4. It was observed that gender and trauma zones did not have a significant effect size on patients whose final visual acuity level could not be evaluated. However, it was observed that the overall effect size of boys was positive in the group whose final BCVA was NLP (β: 1.1657; p=0.0039). In patients with a final BCVA below 0.1, Trauma Zone 1 (β: −0.0054; p=0.0410) and Zone 2 (β: −0.0034; p=0.0211) exhibited a negative overall effect size.

Discussion

The main findings of this study are that, first, the average age for child injuries was 7.4 (95% CI: 6.9–8.5) year, second, the injury rate in boys was 66.8% (95% CI: 61.8–71.4), and third, Trauma zone 1 had the highest rate of 63.8% (95% CI: 60.1–67.3). To the best of our knowledge, this is the first study to use meta-analysis to investigate pediatric open globe injuries in Türkiye. Although the majority of previous Turkish studies presented have focused on hospital-based incidence reports of pediatric OGI, the overall number of OGI-related findings is more significant than individual studies.

In many studies, the age of OGI patients has been presented as an important factor in the management of the disease (1,15,16). Some pediatric eye injury studies conducted in Asia showed an age distribution of 4–10 years with rates

Table 3. Data showing the Egger's test, I2 , and Q test results

	Mean	Standard error	Lower-upper	p	I2	Egger's p
Age	7.74	0.397	6.963–8.517	<0.001	86.019 (P<0.001)	0.205
	Event rate		**Lower-upper**	**p**	**I2**	**Egger's p**
Male*	0.668		0.618–0.714	<0.001	51.631 (P=0.060)	0.710
Female*	0.332		0.286–0.382	<0.001	51.631 (P=0.060)	0.710
Trauma place-Undetectable**	0.090		0.045–0.172	<0.001	78.992 (P<0.001)	0.057
Trauma place-Home**	0.469		0.224–0.731	<0.001	98.154 (P<0.001)	0.046
Trauma place-School**	0.042		0.021–0.081	<0.001	73.340 (P<0.001)	0.053
Trauma place-Outdoor**	0.408		0.219–0.628	<0.001	97.231 (P<0.001)	0.075
Causative Agent (Blunt object)**	0.098		0.027–0.298	<0.001	96.151 (P<0.001)	0.089
Causative Agent (Pointed. Sharp object)**	0.719		0.583–0.824	<0.001	93.058 (P<0.001)	0.455
Causative Agent (Firearm)**	0.040		0.018–0.085	<0.001	72.177 (P=0.003)	0.248
Causative Agent (Undetectable. Unspecified)*	0.130		0.098–0.170	<0.001	46.474 (P=0.096)	0.078
Trauma type-Penetrating**	0.816		0.736–0.876	<0.001	84.245 (P<0.001)	0.094
Trauma type-Perforating*	0.003		0.001–0.014	<0.001	19.553 (P=0.289)	0.337
Trauma type-Rupture**	0.095		0.036–0.228	<0.001	94.453 (P<0.001)	0.702
Trauma type-Intraocular Foreign Body**	0.078		0.045–0.132	<0.001	80.217 (P<0.001)	0.865
Trauma Zone 1*	0.638		0.601–0.673	<0.001	24.234 (P=0.252)	0.333
Trauma Zone 2**	0.254		0.201–0.316	<0.001	70.204 (P=0.005)	0.944
Trauma Zone 3**	0.105		0.058–0.183	<0.001	87.783 (P<0.001)	0.822
Time interval to hospital admission (<24 h)*	0.854		0.779–0.907	<0.001	52.084 (P=0.124)	0.126
Time interval to hospital admission (24–48 h)*	0.120		0.087–0.162	<0.001	24.159 (P=0.042)	0.065
Time interval to hospital admission(>48 h)*	0.024		0.061–0.088	<0.001	47.700 (P=0.148)	0.295
Baseline BCVA1-not evaluated**	0.119		0.033–0.346	<0.001	95.823 (P<0.001)	0.085
Baseline BCVA-NLP1*	0.044		0.028–0.068	<0.001	25.157 (P=0.033)	0.182
Baseline BCVA <20/200**	0.516		0.157–0.859	<0.001	96.860 (P<0.001)	0.251
Baseline BCVA >20/200**	0.288		0.062–0.711	<0.001	96.947 (P<0.001)	0.801
Final BCVA-not evaluated**	0.088		0.032–0.218	<0.001	89.804 (P<0.001)	0.148
Final BCVA-NLP**	0.051		0.023–0.111	<0.001	78.103 (P=0.001)	0.461
Final BCVA<0.1**	0.337		0.141–0.612	<0.001	97.955 (P<0.001)	0.394
Final BCVA>0.1**	0.482		0.343–0.625	<0.001	93.137 (P<0.001)	0.371

BCVA: Best-corrected visual acuity, NLP: No light perception. *Fixed-effect model was used. **Rondom-effect model was used. 1BCVA and NLP stand for best corrected visual acuity and no light perception respectively.

of 38–54% (17,18). An Italian report demonstrated that 54% of the total traumas were at ages between 8 and 12 (15). We included studies of pediatric OGI patients with no age group restrictions in our meta-analysis and obtained the mean age of 7.4 years from the pooled data of the studies. This figure is between the values given from Asia and Europe. Current literature supports that boys are more exposed to OGI than girls (19). Among the studies included in our meta-analysis, there were 586 (65.69%) male patients in the study of Batur et al. (20) Also, the highest rate of male children in the study of Sul et al. was 70.87% (21). Overall, our study displayed that boys are proportionally more affected with OGI than girls like the literature.

In the literature, the distribution of injury localization of childhood OGI is 51–67% zone 1, 20–33% zone 2, and 8–12% zone 3 (22-24). Of the studies that we included in the meta-analysis, no zoning was made only in the study of Sul et al. (21) However, they reported trauma localizations

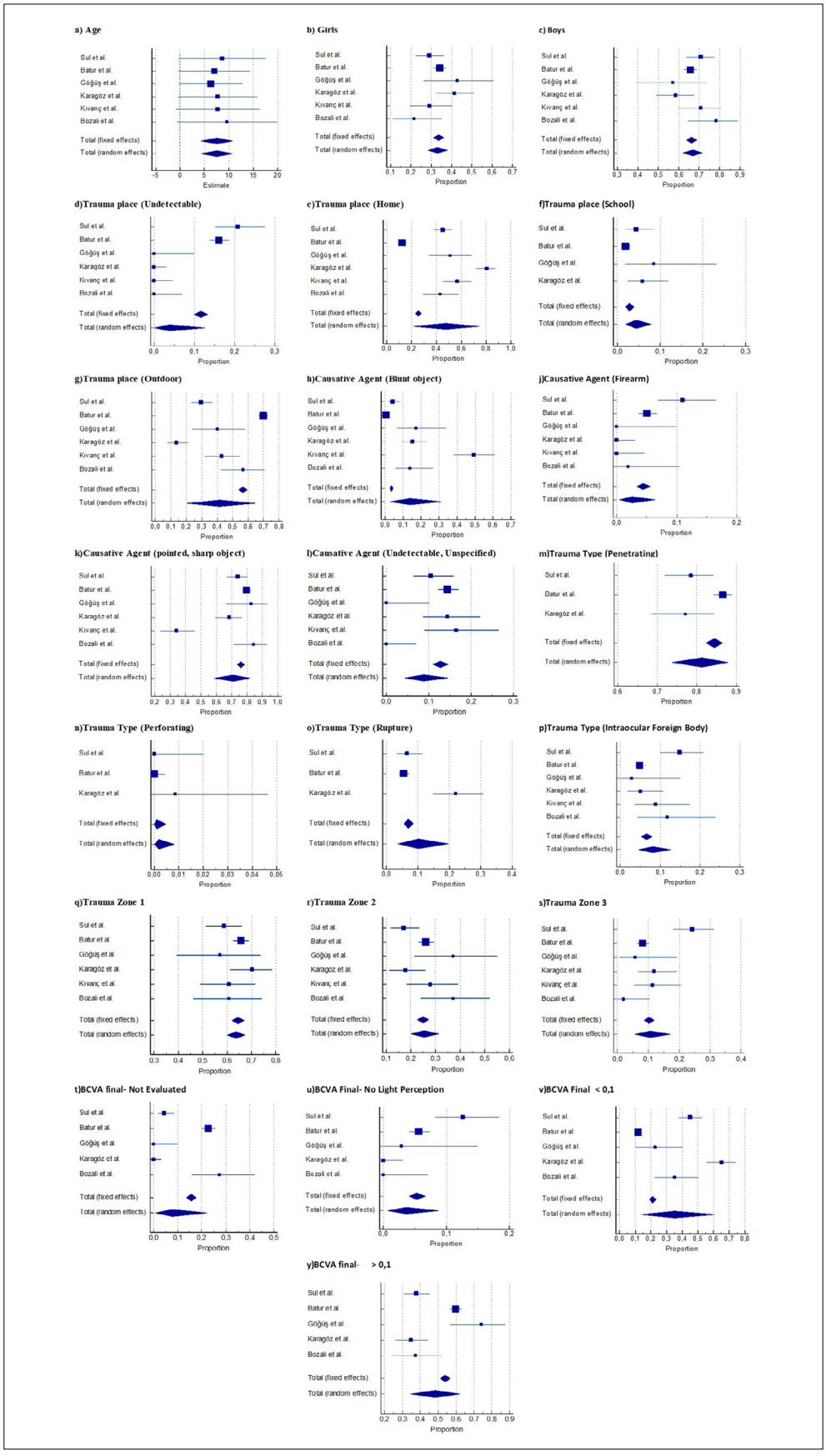

Figure 3. Forest plot graphics of the data.

Table 4. Meta-regression analysis of data

	Coefficient	Standart error	95% Lower	95% Upper	P
Final BCVA1 not evaluated					
Intercept	–7.4356	3.2098	–13.4327	3.9167	0.1408
Gender (Male/Female)	1.1372	3.2417	–3.7084	5.1259	0.3830
Intercept	–4.7126	0.3891	–6.1916	–2.7193	0.002
Trauma Zone 1	0.0142	0.0105	0.0079	0.0159	0.0022
Intercept	–3.1239	0.5941	–4.2318	–1.9923	<0.001
Trauma Zone 2	0.0410	0.0123	0.0044	0.0691	0.0024
Intercept	–4.3270	0.2815	–6.3115	–3.4326	<0.001
Trauma Zone 3	0.0917	0.0102	0.0408	0.1473	0.0013
Final BCVA-NLP1					
Intercept	–7.5106	0.5601	–9.2216	–5.4285	<0.001
Gender (Male/Female)	1.1657	0.3204	0.6138	2.7199	0.0039
Intercept	–2.7631	1.2233	–4.9084	–1.6230	0.0040
Trauma Zone 1	0.0213	0.0174	–0.0142	0.0514	0.4310
Intercept	–2.7168	1.5423	–4.1378	–0.8958	0.0051
Trauma Zone 2	0.0013	0.0014	–0.0242	0.0155	0.6431
Intercept	–2.4081	1.7693	–4.6971	–2.0258	0.0167
Trauma Zone 3	0.0365	0.0152	–0.0398	0.0842	0.4503
Final BCVA<0.1					
Intercept	–0.3012	2.7593	–5.1723	5.6920	0.8232
Gender (Male/Female)	–0.3053	2.1224	–4.3262	2.9707	0.3578
Intercept	–0.0145	0.3127	–2.0060	1.0517	0.6064
Trauma Zone 1	–0.0054	0.0044	–0.0091	0.0066	0.0410
Intercept	–0.0238	0.1926	–1.0120	0.8479	0.8211
Trauma Zone 2	–0.0034	0.0013	–0.0251	–0,0011	0.0211
Intercept	0.0240	0.5130	–1.3116	1.1629	0.6211
Trauma Zone 3	–0.0314	0.0243	–0.0825	0.0605	0.1192
Final BCVA>0.1					
Intercept	1.8042	0.9376	–3.0378	2.9715	0.5410
Gender (Male/Female)	–0.4371	0.4613	–3.0619	2.0124	0.4134
Intercept	–0.2180	0.3768	–0.7813	0.5618	0.6132
Trauma Zone 1	0.0014	0.0017	–0.0057	0.0061	0.6013
Intercept	–0.2906	0.3006	–0.7501	0.4703	0.7015
Trauma Zone 2	0.0350	0.0041	–0.0011	0.0487	0.3864
Intercept	0.0610	0.4414	–2.1080	1.3799	0.7408
Trauma Zone 3	–0.0031	0.0218	–0.0354	0.0712	0.8741

BCVA: Best-corrected visual acuity; NLP: No light perception. 1BCVA and NLP stand for best corrected visual acuity and no light perception respectively.

in detail. Clear information about the trauma zones was obtained by contacting the researchers (Dr.S.S.) (21). Our analysis showed a trauma zone distribution between 63.8% (95% CI: 60.1–67.3) in zone 1, 25.4% (95% CI: 20.1–31.6) in zone 2, and 10.5% (95% CI: 5.8–18.3) in zone 3. This result supported the international literature (22-24).

In many studies, the most common cause of OGI is those that occur with sharp-pointed type objects (17,25). In the

study of Batur et al., the cause of OGI in 713 of 892 eyes (79.93%) was sharp-pointed type objects (20), and Bozali et al. have reported this ratio as % 86.2 (44/51) in pediatric OGI (26). In the study of Kivanc et al., injuries with sharp-pointed type objects were reported in 27 patients (34.17%) (27). OGI caused by firearms maintains its importance. Among the studies included in this study, injuries with this causative agent were reported in only two studies. One possible explanation for that, one of the researches is from an important referral center in Türkiye's capital, while the other is from a major referral center closer to the countryside (20,21). An interesting point is that OGI occurring with blunt objects in all studies in the meta-analysis was low, but in Kivanc et al.'s (27) study, it was more likely to be the cause than the sharp-pointed type objects. Only one study in this meta-analysis detected all the causative agents of OGI in the study population (28).

In studies evaluating the places where OGI occurred, it was found that the most common traumas occurred at home or on the street (29-31). In all the studies we examined in our meta-analysis, it was observed that the location of the trauma was questioned. We analyzed that the injuries mostly occurred at home (46.9% [95% CI: 22.4–73.1]) and later outdoors (40.8% [95% CI: 21.9–62.8]). Considering that the average age of the patients documented in the study is 7.4 years, it is thought that this age group is more susceptible to in-house injuries, and precautions are needed in this regard. Sometimes it may not be possible to determine the place where the trauma occurred, only 2 of the studies included in our analysis have cases in which the place where the trauma occurred cannot be identified (supplement) (20,21).

Initial and final BCVA were specified in most of the studies in the meta-analysis. The group with BCVA <20/200 was higher at baseline, while the group with BCVA >0.1 was higher at the final examination. It was observed that gender and trauma zones did not have a significant effect size on patients whose final BCVA level could not be evaluated. However, it was observed that the overall effect size of boys was positive in the group whose final BCVA was NLP (β: 1.1657; p=0.0039). Trauma Zone 1 (β: –0.0054; P = 0.0410) and Zone 2 (β: −0.0084; p=0.0256) exhibited a negative overall effect size in patients with a final BCVA of <0.1. The positive effect size of boys in the NLP level group in our meta-regression model suggests that trauma in boys are associated with more severe visual outcomes. Since BCVA is generally immeasurable in children, a positive effect size can be expected for the patient group where BCVA cannot be measured in trauma zones 1, 2, and 3. The negative effect size for patients with BCVA below 0.1 and patients in trauma zone 1 and 2 coincides with the clinically observed data. Also, we think that it is a remarkable finding that a significant effect size could not be observed when the meta-regression model was evaluated for patients with Trauma Zone 3 and final BCVA <0.1. Since the visual acuity distribution above 0.1 is not homogeneous, it can be expected to obtain non-significant effect size measurement according to gender and trauma zones in this patient group, as reported in our meta-regression. It is difficult to obtain BCVA values in pediatric age groups. Thus, we must take this information into account when evaluating this data.

No bias was detected in the data of the OGI studies, except for the first 24-h report at the time of admission. This generally suggests that the OGI data reporting approach is consistent across studies. However, one of the most important limitations of this research is the small number of studies. Besides, the lack of standardization in the presentation of the data, i.e., the absence of pediatric ocular trauma scores in most of the studies, reduces the amount of pooled data that can be obtained from the studies. Therefore, additional studies and meta-regression models are needed on this subject from Türkiye.

Conclusion

Pediatric OGI is one of the important health problems, and we think that standardized research will contribute to the enlightenment of this issue.

Disclosures

Ethics Committee Approval: This study was conducted in accordance with the Declaration of Helsinki. Approval for our research was obtained from the local ethics committee (Approval number: 2019.03.2.01.025).

Informed Consent: Written informed consents were obtained from all patients

Conflict of Interest: None declared.

Funding: There is no funding source for this study.

Use of AI for Writing Assistance: Not declared.

Author Contributions: Concept – K.A., L.D., H.K.E.; Design – K.A., H.K.E., F.G.S.;Supervision – K.A., L.D.; Resource – K.A., H.K.E., F.G.S.; Materials – K.A., L.D., A.T.Ç.; Data Collection and/or Processing – H.K.E., F.G.S., K.R.Z.; Analysis and/or Interpretation – K.A., L.D., F.G.Z.; Literature Search – K.A., H.K.E., F.G.Z.; Writing – K.A., H.K.E.; Critical Reviews – K.A., A.T.Ç.

Acknowledgements: We thank Asena Ayça Özdemir from the Department of Biostatistics and Medical Informatics of Mersin University for her support.

Peer-review: External peer-reviewed.

References

1. Kinoshita M, Ihara T, Mori T. Characteristics of pediatric ocular trauma in a pediatric emergency department in Japan. Am J Emerg Med 2023;70:75−80. [CrossRef]
2. Chen V, Pharr C, Junn S, Kraus CL, Fliotsos M, Park HJ, et al. Baltimore pediatric ocular trauma study: Health disparities and outcomes in pediatric and adolescent open globe trauma. Injury 2023;54:533−9. [CrossRef]

3. Abbott J, Shah P. The epidemiology and etiology of pediatric ocular trauma. Surv Ophthalmol 2013;58:476–85. [CrossRef]
4. Mori T, Kinoshita M, Nomura O, Ihara T. Risk factors of pediatric ocular trauma related to ophthalmic complications. Pediatr Int 2023;65:e15558. [CrossRef]
5. Xue C, Yang LC, Kong YC. Application of pediatric ocular trauma score in pediatric open globe injuries. Int J Ophthalmol 2020;13:1097–101. [CrossRef]
6. Qi Y, Zhang FY, Peng GH, Zhu Y, Wan GM, Wang WZ, et al. Characteristics and visual outcomes of patients hospitalized for ocular trauma in central China: 2006-2011. Int J Ophthalmol 2015;8:162–8.
7. Kuhn F, Morris R, Witherspoon CD, Mann L. Epidemiology of blinding trauma in the United States Eye Injury Registry. Ophthalmic Epidemiol 2006;13:209–16. [CrossRef]
8. Soylu M, Sizmaz S, Cayli S. Eye injury (ocular trauma) in southern Turkey: Epidemiology, ocular survival, and visual outcome. Int Ophthalmol 2010;30:143–8. [CrossRef]
9. Moher D, Liberati A, Tetzlaff J, Altman DG; PRISMA Group. Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. PLoS Med 2009;6:e1000097. [CrossRef]
10. Stroup DF, Berlin JA, Morton SC, Olkin I, Williamson GD, Rennie D, et al. Meta-analysis of observational studies in epidemiology: A proposal for reporting. Meta-analysis Of Observational Studies in Epidemiology (MOOSE) group. JAMA 2000;283:2008–12. [CrossRef]
11. Pieramici DJ, Sternberg P Jr, Aaberg TM Sr, Bridges WZ Jr, Capone A Jr, Cardillo JA, et al. A system for classifying mechanical injuries of the eye (globe). The Ocular Trauma Classification Group. Am J Ophthalmol 1997;123:820-31. [CrossRef]
12. DerSimonian R, Kacker R. Random-effects model for meta-analysis of clinical trials: An update. Contemp Clin Trials 2007;28:105–14. [CrossRef]
13. Cochran WG. The combination of estimates from different experiments. Biometrics 1954;10:101–29. [CrossRef]
14. Egger M, Davey Smith G, Schneider M, Minder C. Bias in meta-analysis detected by a simple, graphical test. BMJ 1997;315:629–34. [CrossRef]
15. Malagola R, Arrico L, Migliorini R, D'Ambrosio EM, Grenga R. Ocular traumatology in children. A retrospective study. G Chir 2012;33:423–8.
16. Gupta A, Rahman I, Leatherbarrow B. Open globe injuries in children: Factors predictive of a poor final visual acuity. Eye (Lond) 2009;23:621–5. [CrossRef]
17. Xu YN, Huang YS, Xie LX. Pediatric traumatic cataract and surgery outcomes in eastern China: A hospital-based study. Int J Ophthalmol 2013;6:160–4.
18. Sharifzadeh M, Rahmanikhah E, Nakhaee N. Pattern of pediatric eye injuries in Tehran, Iran. Int Ophthalmol 2013;33:255–9. [CrossRef]
19. Schörkhuber MM, Schneider MR, Riedl R, Wackernagel W, Brandner M, Wedrich A. Gender differences in open globe injuries in children. Spektrum Augenheilkd 2013;27:305–10. [CrossRef]
20. Batur M, Seven E, Akaltun MN, Tekin S, Yasar T. Epidemiology of open globe injury in children. J Craniofac Surg 2017;28:1976–81. [CrossRef]
21. Sul S, Gurelik G, Korkmaz S, Ozdek S, Hasanreisoglu B. Pediatric open-globe injuries: Clinical characteristics and factors associated with poor visual and anatomical success. Graefes Arch Clin Exp Ophthalmol 2016;254:1405–10. [CrossRef]
22. Soliman MM, Macky TA. Pattern of ocular trauma in Egypt. Graefes Arch Clin Exp Ophthalmol 2008;246:205–12. [CrossRef]
23. Cariello AJ, Moraes NS, Mitne S, Oita CS, Fontes BM, Melo LA Jr. Epidemiological findings of ocular trauma in childhood. Arq Bras Oftalmol 2007;70:271–5. [CrossRef]
24. Lesniak SP, Bauza A, Son JH, Zarbin MA, Langer P, Guo S, et al. Twelve-year review of pediatric traumatic open globe injuries in an urban U.S. population. J Pediatr Ophthalmol Strabismus 2012;49:73–9. [CrossRef]
25. Hill JR, Crawford BD, Lee H, Tawansy KA. Evaluation of open globe injuries of children in the last 12 years. Retina 2006;26:S65–8. [CrossRef]
26. AlDahash F, Mousa A, Gikandi PW, Abu El-Asrar AM. Pediatric open-globe injury in a university-based tertiary hospital. Eur J Ophthalmol 2020;30:269–74. [CrossRef]
27. Kıvanç SA, Budak BA, Özmen AT, Yıldız M, Çevik MT, Hamidi NA. Demographics of the open-globe injuries in pediatric age group in Northwest Turkey. J Curr Pediatr 2016;14:104–9. [CrossRef]
28. Göğüş MU, Arıkan G, Çetin Dora G, Berk AT. Çocuklarda açık glob yaralanmaları. MN Oftalmol [Article in Turkish] 2016;23:110–6.
29. Kutlutürk Karagöz I, Söğütlü Sarı E, Kubaloğlu A, Elbay A, Çallı Ü, Pinero DP, et al. Characteristics of pediatric and adult cases with open globe injury and factors affecting visual outcomes: A retrospective analysis of 294 cases from Turkey. Ulus Travma Acil Cerrahi Derg 2018;24:31–8. [CrossRef]
30. Thompson CG, Kumar N, Billson FA, Martin F. The aetiology of perforating ocular injuries in children. Br J Ophthalmol 2002;86:920–2. [CrossRef]
31. Ilhan HD, Bilgin AB, Cetinkaya A, Unal M, Yucel I. Epidemiological and clinical features of paediatric open globe injuries in southwestern Turkey. Int J Ophthalmol 2013;6:855–60.