Systematic Review / Meta-analysis

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Health-related quality of life outcomes in children after congenital heart disease surgery in low-middle-income countries: a systematic review and meta-analysis

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Introduction: Improved treatments for children with congenital heart disease (CHD) have led to a growing interest in long-term functional outcomes such as health-related quality of life (HRQOL). Studies on HRQOL in children with CHD have yielded contradictory results. In this study, we aimed to perform a systematic review and meta-analysis to analyze the effect of surgery on HRQOL outcomes in children with CHD in low-income and middle-income countries.

Methods: A comprehensive search for articles was performed using the Medline (PubMed), Scopus, and Embase databases from their inception to September 5, 2023. Studies reporting QOL outcomes in children < 18 years and published in English were included.

Results: Of the 1239 records screened, 10 studies, including 1721 participants, were included in the study. The overall QOL was significantly better in the control group than in the children who underwent surgery for CHD ($P = 0.04$, standard mean difference of −0.62, 95% CI: −1.2 to −0.04), and the overall QOL was significantly better in the children with CHD after surgery than before surgery ($P = 0.05$, standard mean difference of −0.56, 95% CI: −1.11 to −0.01).

Conclusion: The QOL of children from low-income and middle-income countries who undergo surgery for CHD is significantly poorer than that of controls in all dimensions except the emotional domain. Meanwhile, surgery has the greatest impact on improving the physical domain in children with CHD after surgery. Strategies to improve HRQOL in this subgroup of patients should be further investigated.

Keywords: congenital heart disease, low-income, middle-income countries, pediatric surgery, quality of life

Introduction

CHD is the most common congenital disorder, affecting approximately 0.8–1.2% of all live births[1,2]. The incidence and mortality rates of CHDs vary worldwide. The incidence is higher in developing countries, especially in Africa and Asia, and lower in developed countries[2]. Mortality from CHD is higher in developing countries than in developed countries[2]. In the past three decades, advances in imaging techniques, interventional cardiology, and congenital cardiac surgery have significantly reduced mortality from CHD[1,3], and an estimated 85% of these children survive into adulthood[4]. Increased survival has shifted the focus of research from improving short-term survival to improving functional outcomes and QOL[5]. In the past two decades, it has become evident that children with CHD are at an increased risk of developing neurodevelopmental and psychiatric disorders, including cognitive, adaptive, motor, speech, behavioral, and executive functioning deficits, as well as autism spectrum disorder and psychiatric conditions that persist into adult life[6].

Previously, most outcome studies have only examined physical health, including anatomic and hemodynamic outcomes, exercise

HIGHLIGHTS

- The quality of life (QOL) in children from low-income and middle-income countries (LMIC) who undergo surgery for congenital heart disease (CHD) is significantly poorer than that in controls.
- Surgery has the greatest impact on improving the physical domain in children with CHD after surgery.
- Strategies to improve health-related quality of life (HRQOL) in children with CHD should be further investigated.

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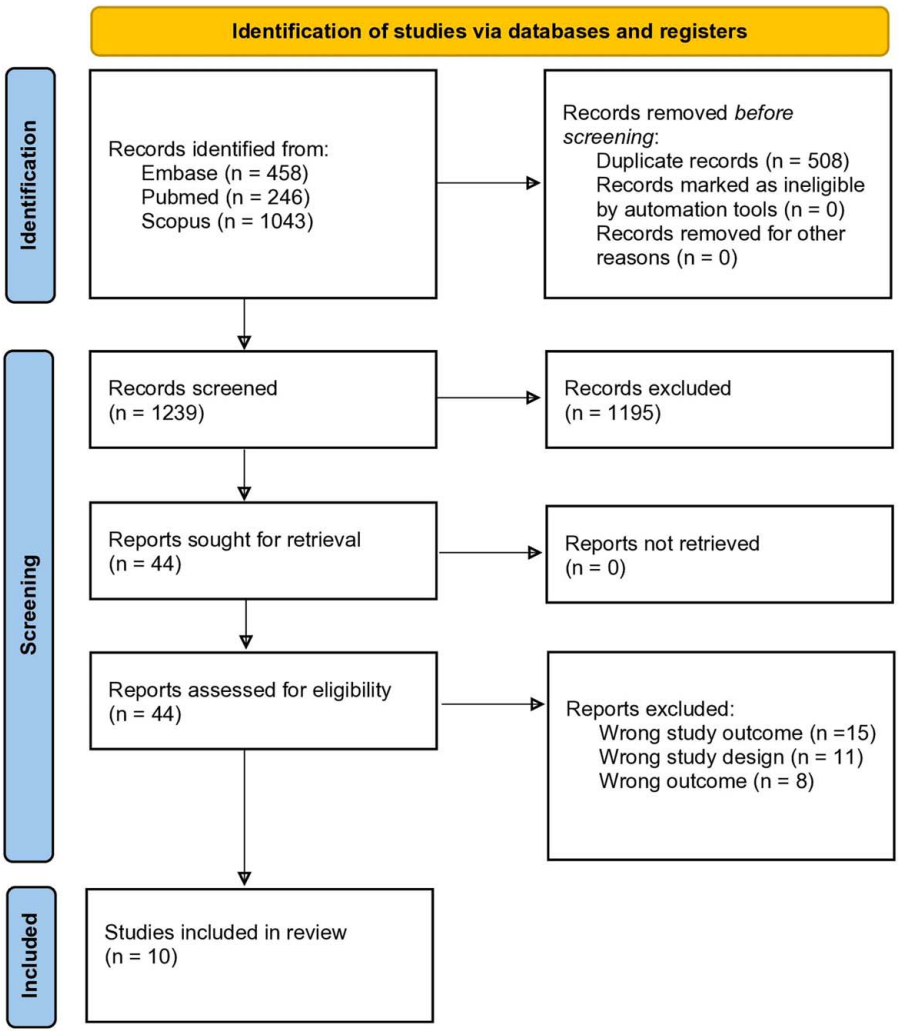

Figure 1. PRISMA flow diagram for the study.

capacity, and electrophysiological sequelae in patients who underwent surgery[7]. However, the real burden is measured only by assessing QOL[8]. QOL is important to measure because it allows for better communication between healthcare providers, patients, and parents, tracks change to a specific treatment and assesses and monitors the effects of psychosocial issues[8].

HRQOL is defined as 'the impact of a specific illness, medical therapy, or health services policy on a patient's ability to function in various life contexts and draw personal satisfaction from physical, psychological, and social functioning (SoF) perspectives'[9]. It is a QOL tool that is often used to measure the burden of diseases and treatments by evaluating mental and physical health. Recent studies have shown conflicting reports on HRQOL outcomes in patients with CHD who underwent surgery. This study aimed to analyze HRQOL outcomes in children who underwent surgery for CHD in LMIC.

Methods

This review was conducted in adherence to the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA, Supplemental Digital Content 1, http://links.lww.com/MS9/A536) guidelines[10]. Quality assessment was performed according to AMSTAR (Supplemental Digital Content 2, http://links.lww.com/MS9/A537) (assessing the methodological quality of systematic reviews) guidelines[11]. Screening was performed for all articles published to the date of September 5, 2023. The protocol for this systematic review and meta-analysis was registered with PROSPERO.

References were identified from independent searches of PubMed, Scopus, and EMBASE databases by two authors (P.L., R.Y.). A Boolean search strategy combined the search terms 'CHD' or 'congenital heart disease' or 'congenital cardiac defect' or 'congenital cardiac disease' AND 'repair' or 'procedure' or 'surgery' or 'correction' or 'operation' AND 'quality of life' or 'life quality' OR 'health related quality of life' or 'HRQOL' (Supplementary file 1, Supplemental Digital Content 3, http://links.lww.com/MS9/A538). For each study shortlisted via this process, the reference section of the paper was checked to identify further studies that were not found in previous database searches. Furthermore, unpublished studies were searched in the gray literature.

Table 1

Characteristics of included studies.

References	Study period	Country	Study type	Type of CHD	Total cases	Male (%)	Age (mean ± SD)	Quality of life measure	Control assignment	Follow-up duration (months)
Ong 2017[19]	2014–2015	Malaysia	cross-sectional	Simple (60.9%), moderate (30.7%), great complexity (8.4%)	179	79 (44.1)	8.5 ± 5.10 years	PedsQL 4	Age, sex-matched siblings	–
Ladak 2018[20]	2008–2015	Pakistan	Cross-sectional	Moderate CHD (66%), Complex CHD (28%)	129	87 (67)	8.84 ± 3.87 years	PedsQL 4, PedsQL Cognitive Functioning Scale, PedsQL 3.0 Cardiac Module	Age-matched siblings	–
Saavedra 2020[21]	2017–2018	Argentina	Cross-sectional	Single ventricle physiology (26%)	31	19 (61.3)	Median 3.3 years (IQR 2.8-4.2)	PedsQL 4	Healthy children from outpatient pediatrics clinic	–
Atmadja 2015[22]	2014–2015	Indonesia	Cross-sectional	VSD (50%), ASD (5%), PDA (25%), ToF (20%)	20	15 (75)	8 ± 5.06 years	PedsQL 4	Age-matched healthy children	–
Searchinger 2023[23]	2022	Uganda	Cross-sectional	NA	115	NA	NA	PedsQL 4	Healthy siblings	–
Alaniz 2021[24]	2017–2018	Mexico	Cross-sectional	VSD (30%), PDA (17.5%)	40	16 (40)	11.6 years	KIDSCREEN-52	Age-matched healthy children	–
Bertoletti 2014[25]	2011–2012	Brazil	Cross-sectional	Mild cyanotic (29.6%), acyanotic with repercussion (44.8%), ToF (13.3%), complex congenital heart disease (12.3%)	203	117 (57.6)	13.64 years	KIDSCREEN-27	–	–
Dai *et al.* 2023[26]	2021	China	Retrospective study	VSD (45.9%), ASD (29.4%), PDA (15.3%), PVS (9.4%)	85	47 (55.3)	2–4 years (61.2%)	PedsQL 4	–	6
Champaneri 2017[27]	NA	India	Prospective study	NA	423	NA	NA	PedsQL TM	–	6
Medina 2020[28]	2016–2018	Colombia	Prospective study	PVS (44%), EA (35%)	112	50 (44.6)	Median 7 years IQR (4.0–11.7)	PedsQL 4	–	12 months

ASD, atrial septal defect; CHD, congenital heart disease; EA, Ebstein Anomaly; IQR, interquartile range; NA, not available; PDA, patent ductus arteriosus; PedsQL 4, Pediatric Quality of Life Inventory 4.0 Scale; PVS, pulmonary valve stenosis; ToF, tetralogy of Fallot; VSD, ventricular septal defect.

Table 2

Quality assessment of the analytical cross-sectional studies using Joanna Briggs Institute critical appraisal checklist for cross-sectional studies.

JBI critical appraisal checklist for analytical cross-sectional studies	Ong 2017[19]	Ladak 2018[20]	Saavedra 2020[21]	Atmadja 2015[22]	Searchinger 2023[23]	Alaniz 2021[24]	Bertoletti 2014[25]
1. Were the criteria for inclusion in the sample clearly defined?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2. Were the study subjects and the setting described in detail?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3. Was the exposure measured in a valid and reliable way?	NA	NA	NA	NA	NA	NA	NA
4. Were objective, standard criteria used for measurement of the condition?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
5. Were confounding factors identified?	No	Yes	No	No	No	No	No
6. Were strategies to deal with confounding factors stated?	No	Yes	No	No	No	No	No
7. Were the outcomes measured in a valid and reliable way?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
8. Was appropriate statistical analysis used?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Overall appraisal quality	High	High	High	High	High	High	High

JBI, Joanna Briggs Institute; NA, not applicable.

We included studies published in the English language, which were case–control or cohort designs reporting children <18 years of age who had undergone CHD repair, which reported the QOL of children. LMICs comprised low-income countries, lower-middle-income countries, and upper-middle-income countries of the World Bank classification of the world's economies into four groups[12]. In cases of overlapping studies, the one with a larger sample size was selected. Exclusions comprised books, case reports, systematic reviews, editorials, animal studies, and studies focusing solely on questionnaire validity and reliability. Additionally, studies with qualitative designs, children with chromosomal/genetic abnormalities, and those without surgical interventions were excluded. Studies in non-English languages, from high-income countries (HIC), or otherwise inaccessible were also excluded. Studies were initially retrieved and duplicates were removed. Authors screened titles and abstracts, followed by individual full-text reviews using COVIDENCE based on inclusion/exclusion criteria. Ten studies were finalized, with discrepancies resolved through consultation with a third author (S.P.). Relevant data from selected studies were extracted into an MS Excel spreadsheet with specific headings.

Two authors (P.L., R.Y.) independently assessed study quality using the Joanna Briggs Institute critical assessment tool for cross-sectional studies, considering eight components that assess overall quality from the perspective of the study subject, diseases, measurement of influencing factors, confounding factors, and data analysis[13]. Responses were categorized as yes, no, unclear, or not applicable. Articles with more than five 'yes' votes were classified as high quality, three to five 'yes' as moderate, and fewer than three 'yes' as poor quality. For follow-up studies, the NHLBI Quality Assessment Tool for Before–After studies was used, involving 12 checklists with responses of 'Yes,' 'No,' 'Not Reported,' 'Not Applicable,' and 'Cannot determine,' with an overall rating of 'Good,' 'Fair,' or 'Poor.' Disagreements were resolved by a third author (S.P.)[14].

Data analysis was performed using Review Manager, version 5.4 (RevMan 5.4) to determine the association between QOL and surgery for CHD. Two study populations: surgery group and control group, who did not undergo surgery for CHD and children prior to and after surgery, were analyzed. A confidence interval of 95% was used for the data analysis. Heterogeneity of the studies was evaluated using the I^2 test. In this study, a funnel plot was used to determine publication bias. A forest plot was provided, and each study was plotted using a square.

The primary effect measure employed in this study was the standardized mean difference (SMD) to assess QOL in two distinct groups: one group had undergone surgical intervention for CHD, while the other group did not. Whenever feasible, SMD was computed individually for each domain of QOL, encompassing the physical, psychosocial, emotional, social, and academic dimensions. The research question formulated was 'What is the impact of surgery on health-related quality of life (HRQoL) outcomes in children with congenital heart disease (CHD) in low- and middle-income countries (LMIC)?'

Results

Eligible studies

An initial literature search with relevant keywords yielded 1747 articles. After excluding 508 duplicates, 1239 articles were

Table 3

Quality assessment using NHLBI Quality Assessment Tool for before–after (pre–post) studies with no control group.

NHLBI Quality Assessment Tool for before–after (pre–post) studies with no control group	Dai *et al.* 2023[26]	Champaneri 2017[27]	Moreno-Medina *et al.* 2020[28]
1. Was the study question or objective clearly stated?	Yes	Yes	Yes
2. Were eligibility/selection criteria for the study population prespecified and clearly described?	Yes	Yes	Yes
3. Were the participants in the study representative of those who would be eligible for the test/service/intervention in the general or clinical population of interest?	Yes	Yes	Yes
4. Were all eligible participants that met the prespecified entry criteria enrolled?	No	Yes	Yes
5. Was the sample size sufficiently large to provide confidence in the findings	Yes	NR	NR
6. Was the test/service/intervention clearly described and delivered consistently across the study population?	Yes	Yes	Yes
7. Were the outcome measures prespecified, clearly defined, valid, reliable, and assessed consistently across all study participants?	Yes	Yes	Yes
8. Were the people assessing the outcomes blinded to the participants' exposures/interventions?	NR	NR	NR
9. Was the loss to follow-up after baseline 20% or less? Were those lost to follow-up accounted for in the analysis?	No	Yes	No
10. Did the statistical methods examine changes in outcome measures from before to after the intervention? Were statistical tests done that provided p values for the pre-to-post changes?	Yes	Yes	Yes
11. Were outcome measures of interest taken multiple times before the intervention and multiple times after the intervention (i.e., did they use an interrupted time-series design)?	No	No	No
12. If the intervention was conducted at a group level (e.g., a whole hospital, a community, etc.) did the statistical analysis take into account the use of individual-level data to determine effects at the group level?	CD	CD	CD
Overall Quality Rating	Fair	Fair	Fair

CD, cannot determine; NR, not reported.

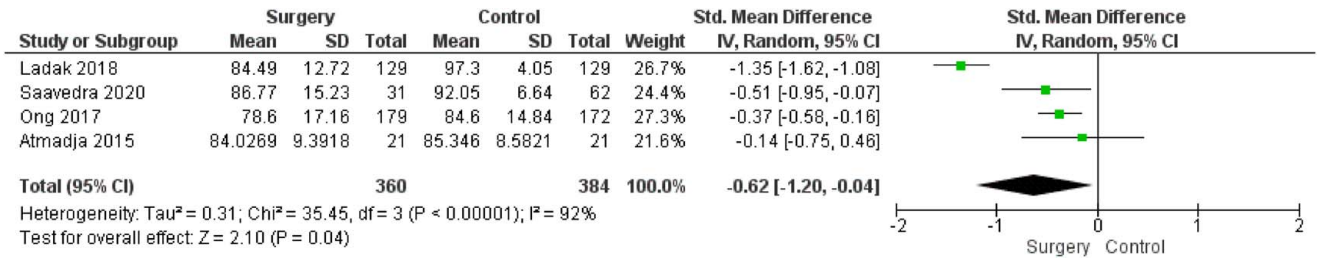

Figure 2. Forest plot of the effect of surgery for CHD on QOL compared to controls. CHD, congenital heart disease; QOL, quality of life.

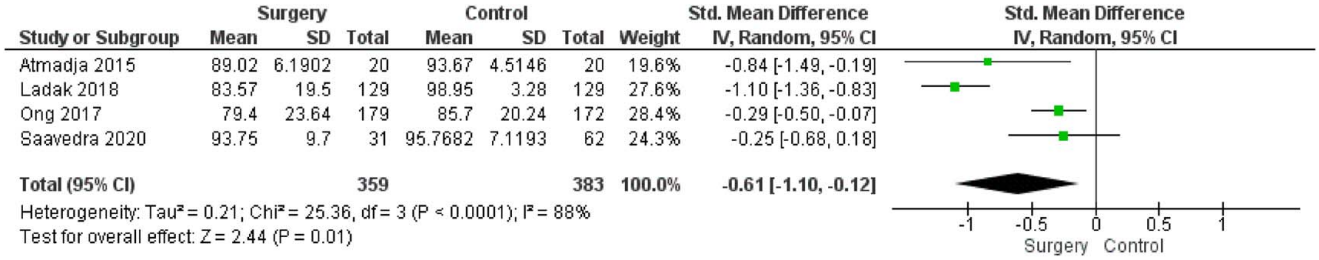

Figure 3. Forest plot of the effect of surgery for CHD on QOL compared to controls within the Physical domain. CHD, congenital heart disease; QOL, quality of life.

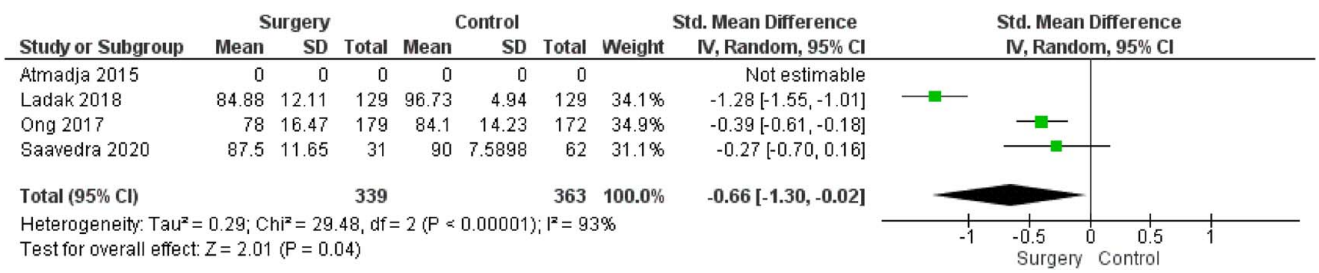

Figure 4. Forest plot of the effect of surgery for CHD on QOL compared to controls within the Psychosocial domain. CHD, congenital heart disease; QOL, quality of life.

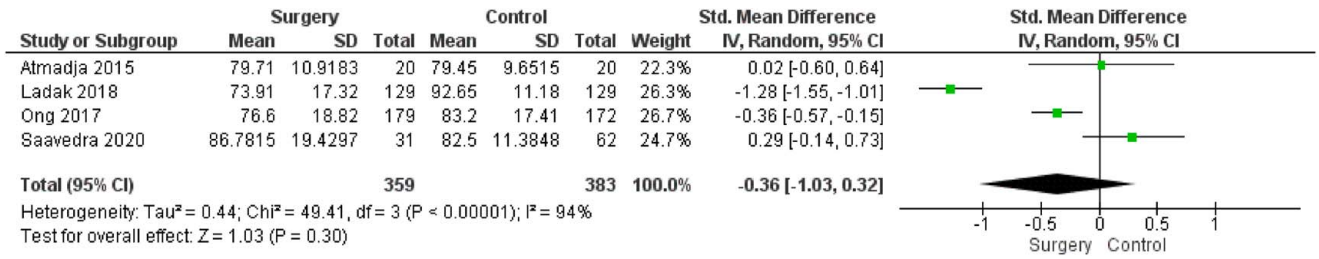

Figure 5. Forest plot of the effect of surgery for CHD on QOL compared to controls within the School domain. CHD, congenital heart disease; QOL, quality of life.

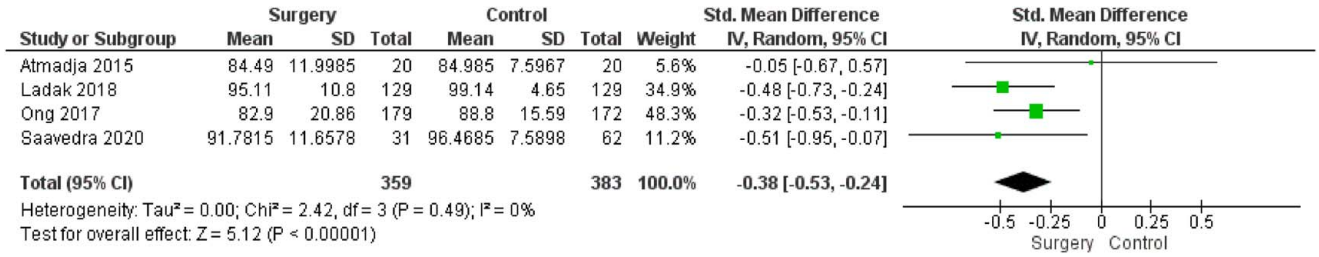

Figure 6. Forest plot of the effect of surgery for CHD on QOL compared to controls within the Social domain. CHD, congenital heart disease; QOL, quality of life.

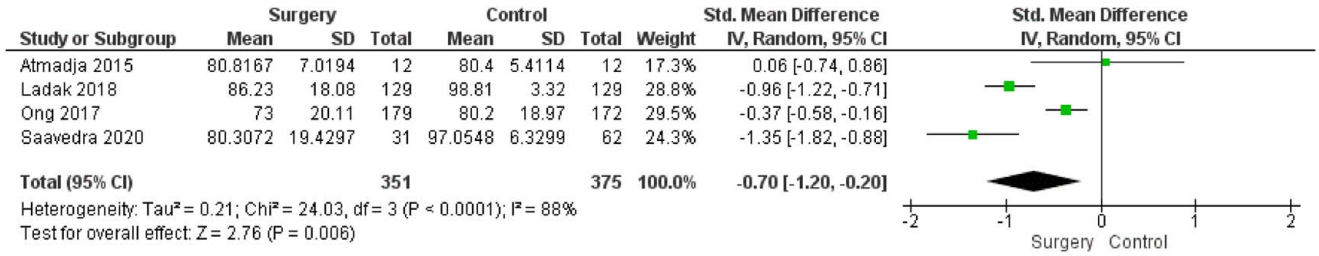

Figure 7. Forest plot of the effect of surgery for CHD on QOL compared to controls within the Emotional domain. CHD, congenital heart disease; QOL, quality of life.

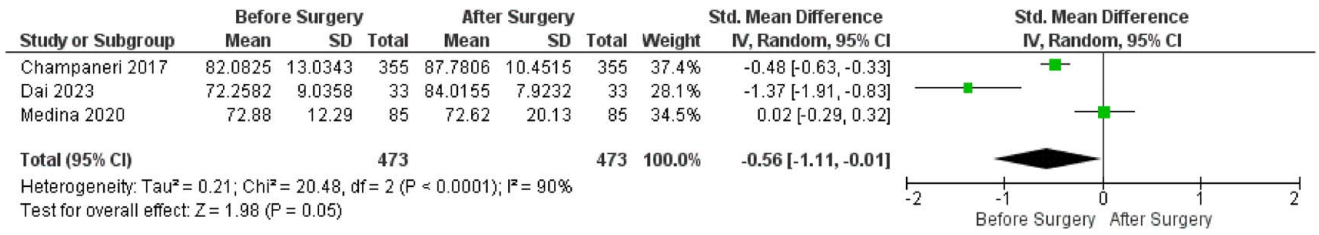

Figure 8. Forest plot of the effect of surgery for CHD on QOL compared before and after surgery. CHD, congenital heart disease; QOL, quality of life.

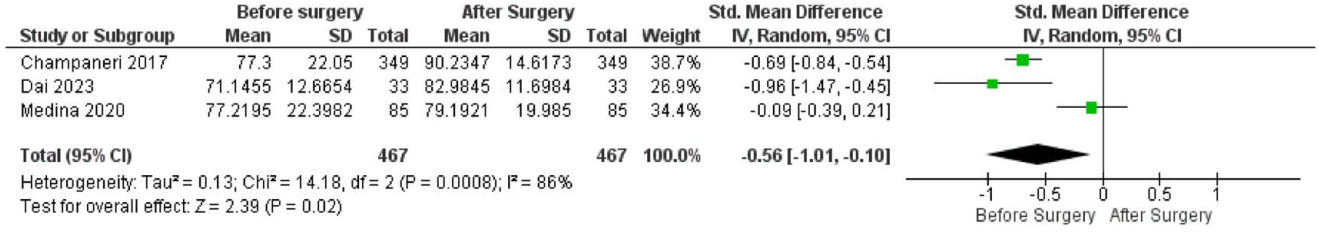

Figure 9. Forest plot of the effect of surgery for CHD on QOL compared before and after surgery within the physical domain of HRQOL. CHD, congenital heart disease; HRQOL, health-related quality of life; QOL, quality of life.

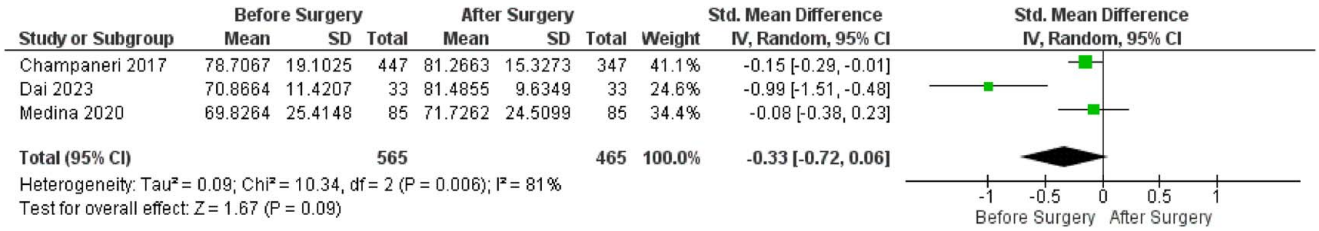

Figure 10. Forest plot of the effect of surgery for CHD on QOL compared before and after surgery within the emotional domain. CHD, congenital heart disease; QOL, quality of life.

screened; among them, 10 articles comprising 1337 cases were included in the systematic review. Among them, seven were considered for the meta-analysis to calculate the SMD of QOL in groups with and without surgery for CHD based on the inclusion/exclusion criteria discussed above. The article selection process is illustrated in Figure 1.

Seven studies in the analysis employed cross-sectional designs. Two used prospective methods, and one used a retrospective approach. Among them, one had missing mean and SD values, and two studies presented outcome measurements utilizing KIDSCREEN rather than Pediatric Quality of Life Inventory (PedsQL), in contrast to other studies. Consequently, these discrepancies resulted in the inclusion of seven studies in the subsequent meta-analysis. We retrieved the raw values of the mean scores and SD for all studies in our analysis. We made every possible effort to contact the authors of these papers to acquire necessary data that were either missing or required. In cases where studies reported QOL data in terms of median and interquartile range, we used a formula to convert these values to mean and SD for consistency[15–18].

The studies were conducted from 2008 to 2022. Geographically, five studies were from Asia, four from South America, and one from Africa (Table 1). Seven studies used the PedsQL 4 to measure HRQOL (Table 1).

Quality analysis

All seven cross-sectional studies scored 'high' quality using the Joanna Briggs Institute critical appraisal tool (Table 2). Similarly, all three follow-up studies scored 'fair' ratings as per NHLBI Quality Assessment Tool (Table 3).

Demographics

The seven studies included in the meta-analysis comprised 833 cases and 384 controls. The proportion of male patients was 53.8%. Their ages ranged from 1 month to 18 years old. The follow-up duration after the surgery ranged from 6 to 12 months. The most common CHD reported was ventricular septal defect. The control groups were age-matched siblings in three studies and age-matched healthy children in three studies.

Health-related quality of life

Six articles assessed the measured QOL in children with CHD after cardiac surgery compared with controls. Among them, four studies were included in the meta-analysis, where the overall QOL was significantly better in the control group than in children who underwent surgery for CHD ($P = 0.04$, SMD of – 0.62, 95% CI: – 1.2 to – 0.04) (Fig. 2). The heterogeneity dropped from 92 to 0% upon exclusion of the study by Ladak and colleagues, even after which, the value was statistically significant. A possible reason could be the greater proportion of patients with complex CHD and the surgical intervention performed at an older age in two-thirds of the patients in the study[20]. In the analysis of each domain, the QOL scores in the physical, psychosocial, social, and school domains in patients who underwent surgery for CHD were significantly lower than in controls (Figs. 3,4,5,6). However, the difference was not significant for the emotional domain (Fig. 7).

Similarly, three studies reported the QOL of children with CHD before and after surgery. The overall QOL was significantly better in children with CHD after surgery than before surgery ($P = 0.05$, SMD of – 0.56, 95% CI: – 1.11 to – 0.01) (Fig. 8). Analysis of each domain revealed that the QOL score within the physical domain exhibited a statistically significant improvement in children with CHD following surgical intervention compared with their presurgery scores (Fig. 9). However, it is noteworthy that the scores within the emotional, social, and school domains did not yield statistically significant differences (Figs. 10, 11, 12).

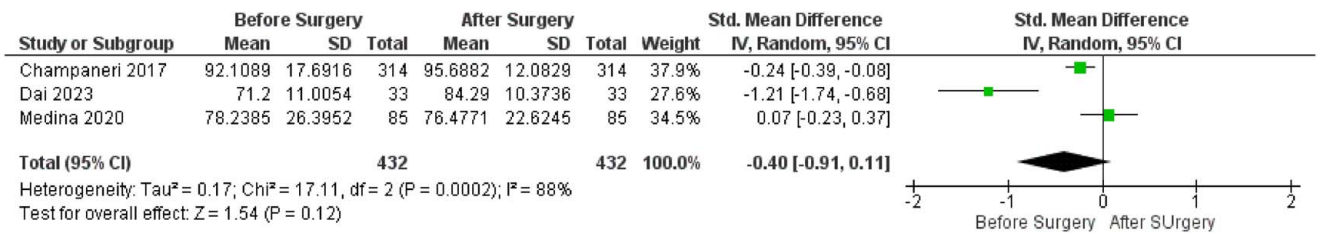

Figure 11. Forest plot of the effect of surgery for CHD on QOL compared before and after surgery within the social domain. CHD, congenital heart disease; QOL, quality of life.

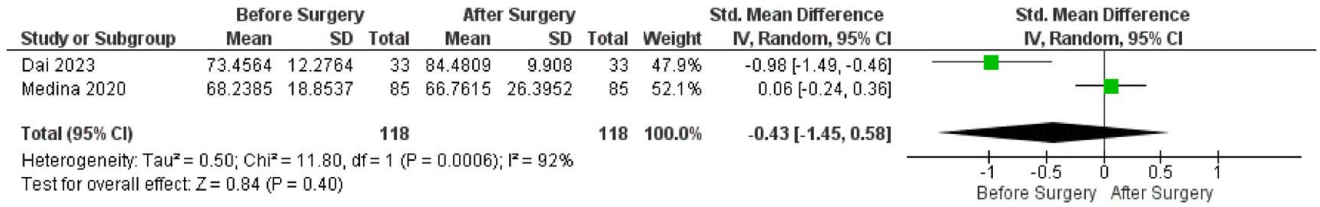

Figure 12. Forest plot of the effect of surgery for CHD on QOL compared before and after surgery within the School domain of HRQOL. CHD, congenital heart disease; HRQOL, health-related quality of life; QOL, quality of life.

Health-related quality of life reported by the parents and the patients

In the pooled analysis of the two studies, there was no significant difference in HRQOL before and after surgery as reported by the parents and the patients ($P = 0.25$, SMD of – 0.14, CI: – 0.37, 0.09, $I^2 = 0$ and $P = 0.22$, SMD of – 0.15, CI: – 0.38, 0.09, $I^2 = 0$, respectively)[26,28] (Figs. 13, 14).

Publication bias

The findings presented an absence of symmetry between studies, suggesting the presence of publication bias (supplementary item; Supplementary Figure A, Figure B, Supplemental Digital Content 4, http://links.lww.com/MS9/A539).

Qualitative review

A study found that individuals with CHD and/or their parents reported notably lower scores in the physical and social aspects of their HRQOL when compared to a control group[29]. Conversely, another study indicated that patients who had undergone surgery reported higher QOL scores in areas related to mood, emotions, autonomy, and parental relationships when compared to the control group[8,25].

Discussion

The findings of our study indicate that children who underwent surgery for CHD exhibited significantly lower scores in overall HRQOL compared to matched controls. This aligns with the broader evidence from a meta-analysis encompassing CHD patients mostly from HIC, where individuals with CHD were consistently reported to have lower HRQOL across all domains in comparison to healthy controls[30]. However, it is noteworthy that some studies from developed nations, such as Germany, have presented a contrasting perspective. Specifically, they reported that children and adolescents with CHD reported HRQOL scores that were at least on par with those of their healthy counterparts[31]. This intriguing finding raises the possibility that various factors, including social support, family environment, peer relationships, school experiences, and community engagement, may contribute to the observed differences. Additionally, a high sense of coherence or coping mechanisms, such as compensation through denial, might play a role in shaping the reported HRQOL among children and adolescents with CHD[32,33]. The complexity of these factors underscores the need for further research to explore the nuances of HRQOL in CHD patients, taking into account the diverse influences that can impact their well-being.

Upon domain-specific analysis, the differences were significant in the physical, psychosocial, social, and academic domains but not in the emotional domain. This observation aligns with the framework of the sense of coherence, which elucidates how individuals with chronic medical conditions adapt to their ailments and find contentment in their lives[31,32].

In contrast, QOL in children with CHD significantly improved in the postoperative period compared with that in the preoperative period. Earlier research findings also noted that children's QOL exhibited ongoing enhancement with increasing duration of treatment. This outcome could suggest that the improvement in their QOL may be a lasting outcome of treatment[34]. Domain-specific analysis revealed that the differences were significant only in the physical domain. A possible explanation is that children may have already adapted to alterations in their emotional and psychosocial domains prior to surgery. Strategies to improve HRQOL in this subgroup of patients in addition to surgery should be further investigated.

Our study did not identify a significant disparity in HRQOL reported by parents and patients, which was the case in prior review from HIC[30]. It is noteworthy that the absence of such a discernible difference in our study could be attributed to the relatively limited number of studies included in our analysis.

The outcomes derived from this meta-analysis should be interpreted cautiously, considering both their merits and demerits. One noteworthy strength of this study pertains to the substantial sample size encompassing 1337 cases and 384 controls,

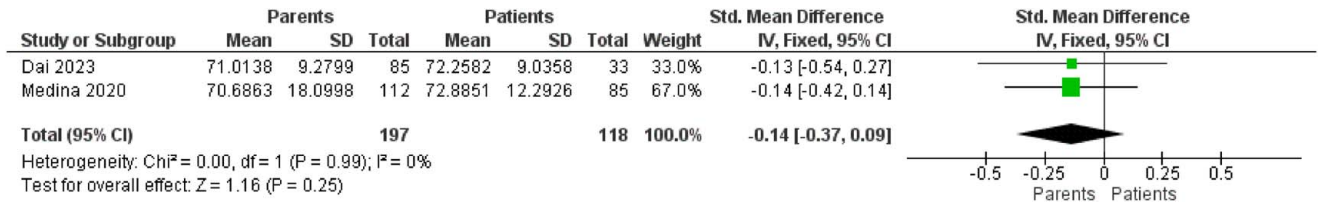

Figure 13. Forest plot of HRQOL reported by parents and patients before surgery. HRQOL, health-related quality of life.

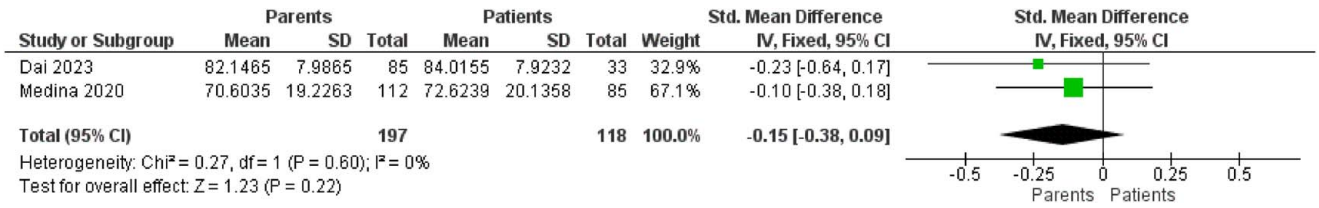

Figure 14. Forest plot of HRQOL reported by parents and patients after surgeryy. HRQOL, health-related quality of life.

which imparts a heightened degree of statistical robustness and precision to our effect estimates. Second, the inclusion criteria exclusively included original studies of medium-to-high quality, thus establishing a foundation for reliable evidentiary sources. To our knowledge, this is the first study to conduct a systematic review and meta-analysis to analyze HRQOL outcomes in children with CHD who underwent surgery in LMIC. Additionally, our research contributes valuable insights into the QOL and health status of children with CHD in LMIC, providing a comparative analysis with similar populations in HIC. In LMIC, healthcare services vary significantly with delays in seeking necessary interventions, and follow-up care after surgery is limited due to resource constraints. Consequently, these patients may not fully experience the anticipated improvements in QOL following surgical procedures. Such circumstances could contribute to the diverse range of outcomes observed across individual studies, adding to the heterogeneity of results.

Nevertheless, it is essential to acknowledge the inherent limitations of this study. First, a notable limitation emerges from the absence of a universally accepted consensus regarding the definition of QOL and the methodology employed in its measurement, despite the majority of studies in our analysis adopting the PedsQL. Another constraint arises from the cross-sectional design utilized in the selected studies, which precludes the establishment of causal relationships or the determination of temporal sequences and direction of effects. Moreover, this cross-sectional approach inhibits our ability to explore long-term changes in QOL. Finally, the potential presence of unaccounted confounding variables like severity of CHD and age group constitutes another limitation that necessitates consideration when interpreting our findings.

Conclusion

The QOL in children from LMIC who undergo surgery for CHD is significantly poorer than that in controls in all dimensions except the emotional domain. Meanwhile, surgery has the greatest impact on improving the physical domain in children with CHD after surgery.

Ethical approval

Systematic reviews/meta-analysis are exempt from ethical approval in our institution.

Consent

This study, being a review, did not directly involve patients.

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None.

Author contribution

P.L.: conceptualization, data collection, data analysis/interpretation, methodology, statistics, drafting the article, critical revision of the article, and approval of the article. R.Y.: conceptualization, data collection, data analysis/interpretation, methodology, statistics, drafting the article, critical revision of the article, and approval of the article. N.N.: data analysis/interpretation, drafting article, methodology, critical revision of the article, and approval of the article. S.P.: data analysis/interpretation, drafting the article, methodology, critical revision of the article, and approval of the article. N.A.: data analysis/interpretation, drafting the article, methodology, critical revision of the article, and approval of the article. R.P.: data analysis/interpretation, drafting article, methodology, critical revision of the article, and approval of the article.

Conflicts of interest disclosure

The authors report no conflicts of interest.

Research registration unique identifying number (UIN)

The protocol for this systematic review and meta-analysis was registered with PROSPERO registration number CRD42023 460815.

Guarantor

Prajjwol Luitel.

Data availability statement

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Provenance and peer review

None.

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