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Mate-Analysis

Personal hygiene among school children in India: a meta-analysis

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ABSTRACT

Good personal hygiene is essential for overall well-being, and it starts from a school age. As parents, it is our responsibility to teach our children the importance of maintaining body healthy. Majority of people, especially school-aged children, suffer from the various diseases, such as scabies, periodontitis, and tooth decay. The Unani system of medicine (USM) put a lot of emphasis on good oral health. Aim was to conduct a meta-analysis of different observational studies to assess school children' personal hygiene and to highlight the possible management and preventive measures of oral diseases through school health programme, education and health policies. Relevant cross-sectional observational studies were included to assess the level of knowledge and awareness regarding Personal hygiene among school children. Data source was electronic and manual search of scientific databases like Google Scholar, PubMed, MEDLINE, and EMBASE. Data selection was 10 studies out of 25 were finally included. Children who have studding in primary to high school. This many studies shows that oral health and knowledge among children was low, oral health practices are poor that can lead many oral health problems like tooth decay, gingivitis and dental caries. Study shows 5.33% children use tooth powder, 7.33% children use coal, ash, neem etc., only one study A. Harikaran show 23.70% children use tooth pick. Overall, about average 60% student think oral health impact on general health, and mostly study shows children not aware for oral health and hygiene and routine dental checkup.

Keywords: Attitude, Knowledge, Personal hygiene in children, School health

INTRODUCTION

The Unani system of medicine (USM) has put a lot of emphasis on personal health. Unani physician Ibn Sina believed that good personal hygiene was essential for overall health.[1]

The importance of the educational approach in the prevention and management of health issues has grown in recent years all over the world. However, it is challenging to spread information through health promotion initiatives in developing countries like India, which has the world's biggest population and limited financial and medical resources to support its continually growing population.[2]

Today, personal hygiene among school-going children is one of the major concerns in India. But lately, it is observed that school children are inclined towards various unhealthy practices of hygiene.[3] Lack of hygiene is one of the major threats to the lives of school children and has a high possibility to get infected with any communicable disease.[4]

Personal hygiene plays an important role in keeping away from any communicable disease and it also helps in resisting the spread of diseases.[5] Children spend maximum time outside the home and are at a very high risk of getting infected with any diseases. It means keeping oneself clean and maintaining hygiene on self.[6]

METHODS

Registration and protocol

The preferred reporting items for systematic reviews and meta-analysis (PRISMA) checklist was used to conduct this systemic review and meta-analysis.

Eligibility criteria for the studies, the present systematic review included the studies conducted on oral health knowledge and awareness among school children. Study selection was based on following inclusion criteria

Study setting

Studies conduct in the India.

Language

Only published paper in English language were selected in the study.

Study population

School children from private and govt. were selected in the study.

Study design

Studies evaluating the knowledge, practices and awareness as outcome measures and observational cross-sectional studies.

Limitation of study

No limitation in terms of publication date was deliberate in the search strategy. The studies that were excluded from the present review were reviews, intervention studies and unpublished material and abstracts.

Identification of appropriate studies and the data collection

Search strategy utilized in the present systematic review is relevant literature search was carried out through search of scientific databases like MEDLINE, EMBASE, PubMed, research gate, google scholar using MESH terms-"School children," "Personal Hygiene," knowledge, awareness, etc., irrespective of the date of publication. Online search engines like "Google Scholar" were also assessed using various keywords knowledge, awareness, self-care, attitude, School children, Personal health, etc.

We identified 40 papers with these methods. Where possible, all terms were included as full text, with elide used where possible to capture variation in the terminology. Finally, ten articles were selected for inclusion in the review.

Selection of studies

After retrieval of references yielded by the electronic and manual searches, full text articles were recovered that met the inclusion criteria. Selected studies were screened using STROBE 2020 checklist for observational cross-sectional studies.

Quality assessment and control of bias assessment

The major aim of quality assessment was to determine the potential for selection bias (eligibility criteria, sampling strategy, sample size, etc.). In observational, cross-sectional research study that reflect knowledge and awareness levels, this is particularly crucial. A total of eight domains were assessed. A score of one was given for fulfilling conditions in each domain, 0.5 for partial fulfillment and zero otherwise (Table 1). The maximum possible score was 8 and a study scoring 8 was classified as high-quality study, 1 study as average quality and 1 study as low quality. otherwise. The quality assessment of the studies was done on the basis of guidelines set forth by PRISRMA and STROBE checklist.

Seven authors independently used a predetermined data collection form to extract information on following eight domains: Title of study, clear objectives, study setting, sample size adequacy, study design, eligibility criteria, sampling strategy and completeness of reporting information regarding personal health and hygiene. Any kind of conflict regarding article screening and extraction was sorted out by author.

Table 1: Quality assessment of studies included in the systemic review.

Authors	Title of study	Clear objectives	Study setting	Sample size adequacy	Study design	Eligibility criteria	Sampling strategy	Completeness of information	Quality
Ansari et al[7]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	High
Seenivasan et al[8]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	High
Sihra et al[9]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	High
Meher et al[10]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	High
Mangal et al[11]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	High
Shekhawat et al[12]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	High

Continued.

Authors	Title of study	Clear objectives	Study setting	Sample size adequacy	Study design	Eligibility criteria	Sampling strategy	Completeness of information	Quality
Mahajan et al[13]	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Average
Pukhraj et al[14]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	High
Nagar et al[15]	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Average
Chutia et al[16]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	High
Maha-Lakshmi et al[17]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	High
Almiya et al[18]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	High
Chakraborty et al[19]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	High

Table 2: Summary of studies reviewed for knowledge, awareness and practices regarding oral health among school children.

Authors	Year of publication	Sample size	Study Population	Study area	Outcome measure	Results
Ansari et al[7]	2014	512	Private school	Bandra, Mumbai Maharashtra	KAB on oral Health	oral health knowledge and awareness among the children was low. Only 53% students are aware of daily school hygiene inspection.
Seenivasan et al[8]	2016	250	Private school	Royapuram North Chennai	Hygiene practices	76.4% (n=191) had good and 23.6% (n=59) had poor hygiene practices. more attention to improve personal hygiene awareness.
Sihra et al[9]	2018	1150	Govt. school	Jaipur, Rajasthan	KAP on personal hygiene	"Children demonstrated good knowledge of personal hygiene, including body care, clothes hygiene, teeth brushing, use of soap, and nail cutting, but showed limited awareness regarding the use of toilet paper and sanitary pads."
Meher et al[10]	2018	440	Govt. school	Kolkata, West Bangal	KAP	Hygiene practices among the school children. Majority of children responded that there were sources of clean water at their houses (94%) and school (84%).
Mangal et al[11]	2019	246	Govt./private school	Southern Rajasthan	KAP on personal hygiene	sources of knowledge on personal hygiene of students. Only 22% of students good personal hygiene practices
Shekhawat et al[12]	2019	1008	Govt. school	Bikaner, Rajasthan	KAP on personal hygiene	A good knowledge and practice were found regarding certain points but still more awareness and promotion are necessary for better personal hygiene in students
Mahajan et al[13]	2020	150	Private medical college,	Slum area, Pune, (Maharashtra)	Hygienic practices	Good hygiene practices were present in only 24%. Parents has significant influence on hygiene habits of children.
Pukhraj et al[14]	2021	150	Private school	Rishikesh, Uttarakhand,	KP towards personal hygiene	Girls were more knowledgeable regarding personal hygiene and also practiced better personal hygiene practices as compared to boys. Maternal education positively influencing this factor.

Continued.

Authors	Year of publication	Sample size	Study Population	Study area	Outcome measure	Results
Nagar et al[15]	2021	100	Rural primary school	Kheda, Gujrat	KAP on personal hygiene	More children had good personal hygiene knowlegede and practices, only 17.3% had low knowledge about personal hygiene.
Chutia et al[16]	2023	216	Higher primary school	Bangalore, Karnataka	KAP on personal hygiene	49.07% children have good knowledge on personal hygiene; majority of children had moderate to low knowledge and suffer oral problem.
Maha-Lakshmi et al[17]	2023	60 school students	Govt. primary school	Andipalayam, Coimbatore, Kerela	KAP	66% children have inadequate knowledge, 14%, children have moderate knowledge and 10% children have inadequate knowledge on personal hygiene.
Almiya et al[18]	2023	410	Rural Schools	Haldwani, Uttarakhand	KAP	Majority of school going children had moderate knowledge of personal hygiene.
Chakraborty et al[19]	2024	498	High School	Murshidabad, West Bangal	KAP	Personal hygiene knowledge and practice was poor and need to be improved

Interpretation of meta-analysis findings

The present meta-analysis synthesised data from multiple observational studies conducted across diverse socio-cultural and geographical contexts in India to assess both the knowledge and practices of personal hygiene among school children. The variables assessed included awareness and behaviours related to soap use, body and clothes hygiene, tooth brushing, oral hygiene maintenance, hair washing, clothes washing, frequency of handwashing and wearing clean clothes.

The pooled prevalence estimates, confidence intervals and heterogeneity statistics offer a comprehensive overview of prevailing hygiene conditions, as well as gaps between awareness and implementation.

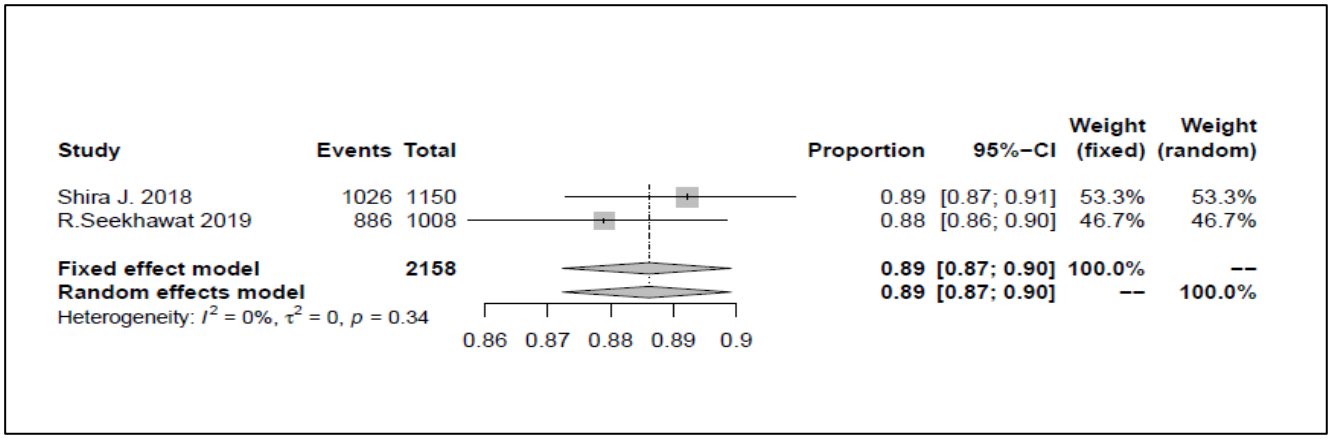

Figure 1: Knowledge of soap use pooled prevalence 89% (95% CI: 0.87-0.90), I²=0%; consistent awareness across studies.

Data from two large scale studies (Shira 2018; Shekhawat 2019) revealed a pooled prevalence of 89% (95% CI: 0.87-0.90) under both fixed- and random-effects models, with no heterogeneity (I^2=0%, p=0.34).[19] This indicates a high and consistent level of knowledge regarding the importance of soap use across different contexts. Such uniformity suggests that public health campaigns and school health education programs promoting soap use have been relatively successful in establishing this as a widely understood hygiene standard.

Three studies produced a pooled prevalence of 97% under the fixed-effect model, but with extreme heterogeneity (I^2=100%). While two studies (Shira 2018; Shekhawat 2019) reported near-universal awareness (>96%), Sarkar (2013) reported a strikingly low prevalence (14%).[19] This disparity highlights significant regional differences, potentially reflecting disparities in health education outreach, socio-economic conditions and availability of resources for personal cleanliness.

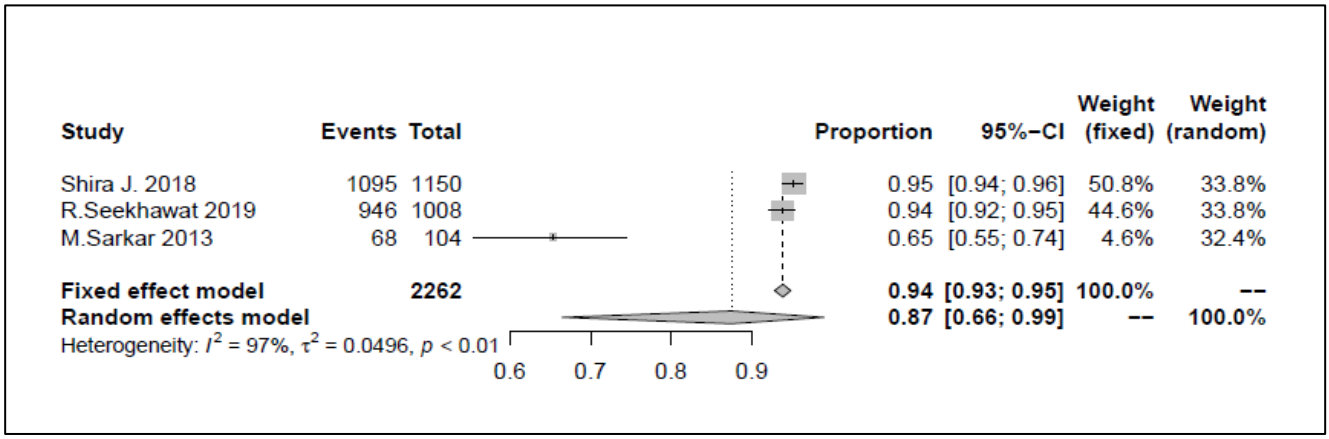

Figure 2: Knowledge of teeth brushing pooled prevalence 94% (95% CI: 0.93-0.95), I²=97%; high awareness with regional variation.

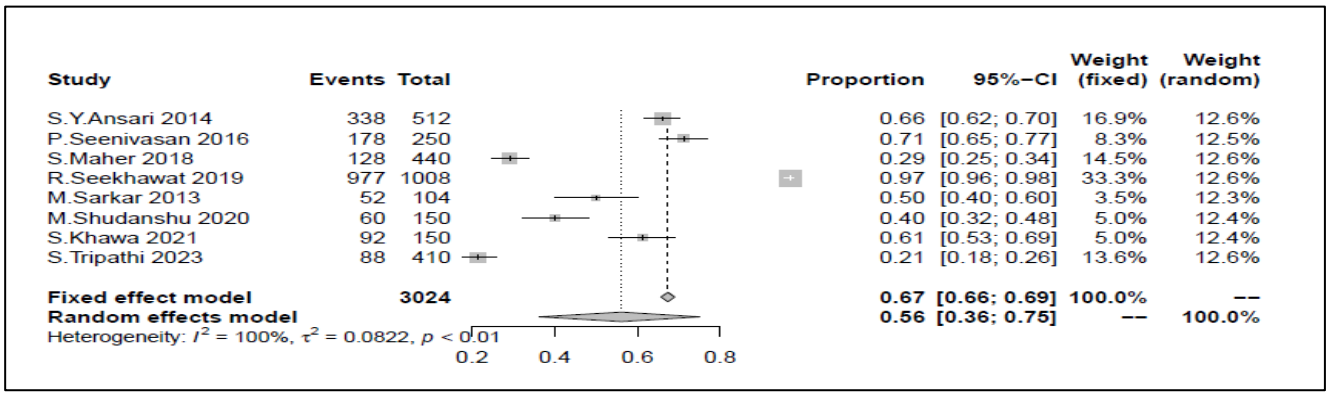

Figure 3: Oral hygiene practice pooled prevalence 67% (95% CI: 0.66–0.69), I²=100%; large variability in practice.

The combined data from three studies yielded a pooled prevalence of 94% (95% CI: 0.93-0.95), but again with high heterogeneity (I²=97%).

Although most children demonstrated awareness of tooth brushing, lower proportion reported by Sarkar (65%) indicates that rural or economically deprived areas may lag behind urban counterparts in oral health education.

Across eight studies, the pooled prevalence was 67% (95% CI: 0.66-0.69), with very high heterogeneity (I²=100%). This variation was pronounced, ranging from 97% in some urban studies to only 21% in certain rural settings. Disparity strongly suggests that while awareness about oral hygiene is often high, barriers such as cost of dental products, parental neglect and inadequate school-based health monitoring hinder consistent practice.

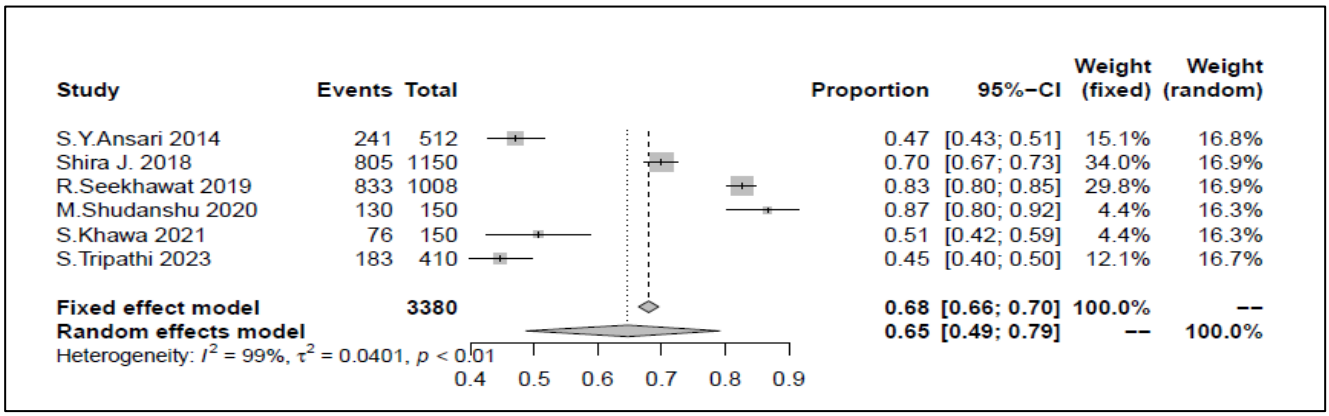

Figure 4: Hair washing frequency pooled prevalence 68% (95% CI: 0.66-0.70), I²=99%; influenced by resources and culture.

Six studies reported a pooled prevalence of 68% (95% CI: 0.66-0.70) with I^2=99%.

The practice varied from as low as 45% in rural regions to 87% in better-resourced settings. Water scarcity, cultural perceptions about hair care frequency, and economic constraints likely contribute to this variation.

This indicator showed uniformly high awareness in two studies, with a pooled prevalence of 95% (95% CI: 0.94-0.96) and no heterogeneity (I^2=0%). This suggests that the concept of keeping clothes clean is well-ingrained among school children, likely reinforced by both school routines and household norms.

Nine studies demonstrated a pooled prevalence of 89% (95% CI: 0.88-0.90) but with extreme heterogeneity (I^2=99%). While majority of studies reported high adherence (>90%), certain rural/underserved areas (e.g., Tripathi, 2023-45%) revealed poor compliance, reflecting inequities in water access, soap availability and health education penetration.

Five studies reported pooled prevalence of 81% (95% CI: 0.79-0.83) with very high heterogeneity (I^2=99%). Prevalence ranged from 96% in urban/affluent areas to only 12% in slum population, emphasising socio-economic determinants as key predictors of hygiene behaviour.

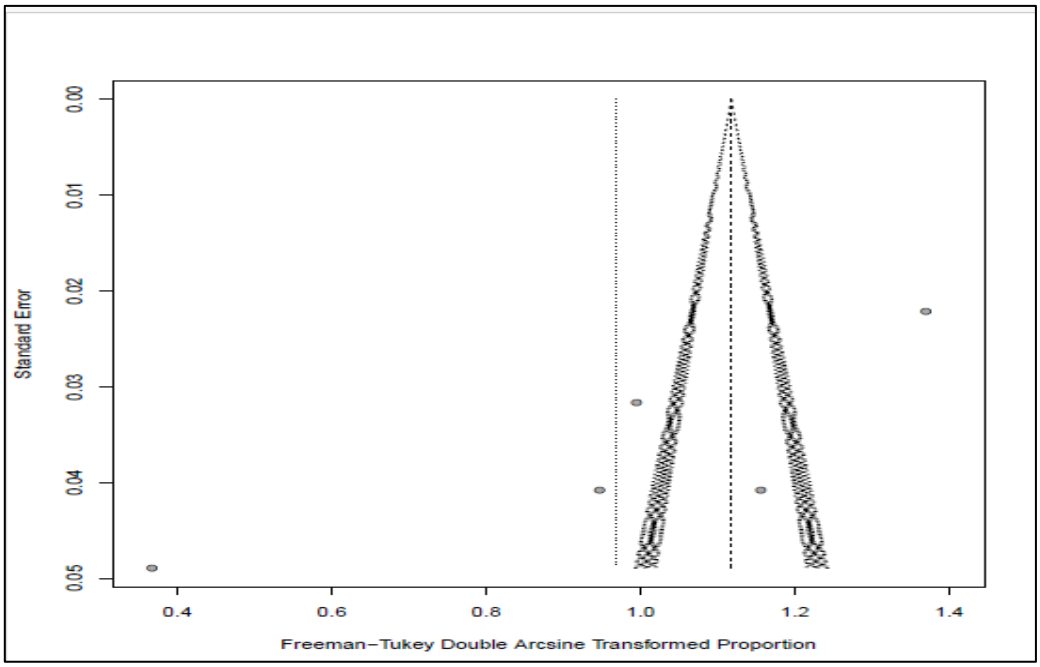

Figure 5: Clean clothes practice.

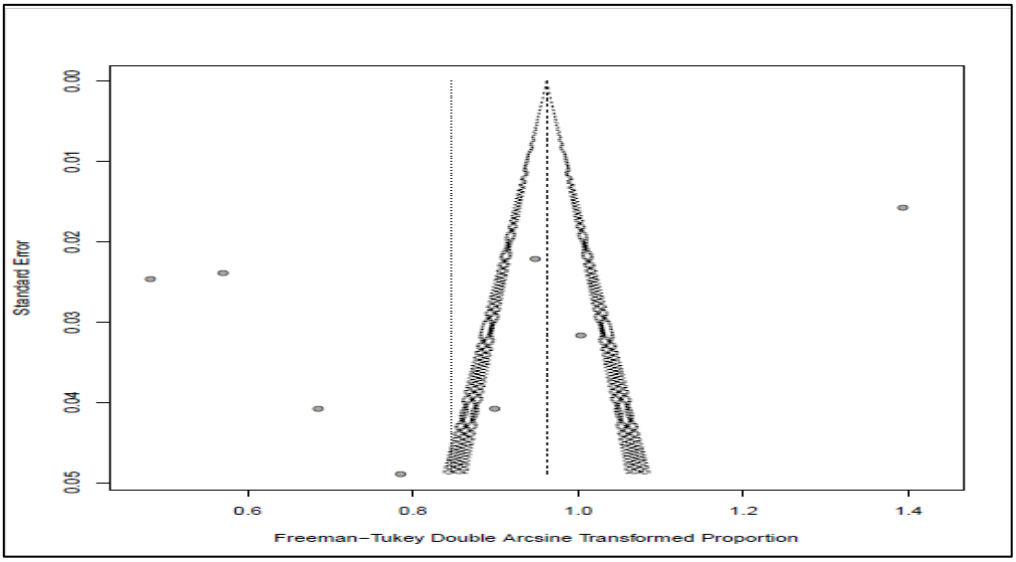

Figure 6: Oral hygiene practice.

Funnel plot reveals noticeable asymmetry with broad distribution, reflecting the large disparities in prevalence between well-resourced urban schools and disadvantaged rural or slum areas.

Funnel plots were generated for all hygiene related indicators to assess potential publication bias and small-study effects. For knowledge indicators knowledge of soap use, knowledge of teeth brushing, knowledge of clothes washing, knowledge of nail cutter use and knowledge of body/clothes hygiene plots were generally symmetrical, with most points clustered at the top. This indicates minimal publication bias, high consistency between studies and aligns with the low heterogeneity observed in the forest plots.

Funnel plot displays wide dispersion and mild asymmetry, suggesting substantial variability in practice levels, likely driven by regional and socio-economic differences rather than selective reporting.

For practice indicators-oral hygiene maintenance, hair washing, nail trimming, bathing frequency, and clean clothes practice-plots showed greater spread and mild asymmetry. This likely reflects genuine behavioural variability rather than selective reporting, with differences driven by socio-economic conditions, access to water and sanitation, and parental guidance. For example, the clean clothes practice funnel plot showed a wide range, consistent with prevalence variations from 96% in urban schools to 12% in slum settings.

Overall, the funnel plots reinforce the study's main finding: awareness of hygiene behaviours is consistent and widespread, while actual practice varies greatly due to structural and contextual barriers.

DISCUSSION

The findings of this meta-analysis provide a nuanced understanding of the personal hygiene scenario among school children in India. While the aggregated data reveal encouragingly high levels of awareness for most hygiene-related knowledge indicators-such as soap use, clothes washing, body/clothes hygiene, and tooth brushing-there is a consistent and worrying gap when these are translated into actual practice.[17,18]

Across all hygiene domains, knowledge indicators generally scored very high, often exceeding 90%, and showed low heterogeneity when large, similar scale studies were compared. This suggests that public health messaging around basic hygiene behaviours has penetrated widely, likely due to long-standing government and non-governmental initiatives, integration into school curricula, and community outreach programs.[17]

However, practice indicators including oral hygiene maintenance, hair washing frequency, wearing clean clothes, and consistent handwashing displayed significant variability, with I^2 values often above 95%. This persistent knowledge, practice gap indicates that awareness campaigns alone are insufficient to ensure behavioural change. Structural and contextual barriers such as poverty, inadequate access to clean water and sanitation facilities, parental educational levels, and inconsistent school health inspection mechanisms remain major impediments to consistent hygiene practice.[17]

For instance, the analysis of clean clothes practice revealed stark disparities, ranging from near universal adherence in urban schools to as low as 12% in disadvantaged communities. Similarly, oral hygiene practices varied from 97% in some better-resourced settings to only 21% in rural or underserved areas. These findings align with the social determinants of health framework, which highlights the pivotal role of environmental and socio-economic conditions in shaping health behaviours.[17,18]

CONCLUSION

From a policy perspective, the results strongly support the need for integrated school health programs that move beyond awareness generation to actively enabling children to adopt good hygiene practices. Such programs should combine: Regular hygiene monitoring by school authorities, provision of hygiene kits in resource-poor schools, parent-focused awareness and skill-building sessions, infrastructural improvements for water and sanitation facilities and school-based reinforcement of hygiene habits through daily routines and inspections.

By targeting both information dissemination and practical facilitation, disparities in personal hygiene among school children in India can be substantially reduced. This will not only improve individual health outcomes by lowering the burden of communicable diseases and improving school attendance but will also contribute to broader public health indicators and national education goals.

Ultimately, the high knowledge rates demonstrate that behaviour change is achievable when health promotion is consistent, well-supported, and contextually adapted. The challenge lies in bridging the gap between knowing and doing a challenge that requires sustained commitment from policymakers, educators, parents, and the wider community.

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