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RESEARCH

Implementation of oral hygiene and handwashing procedures among preschool children: An interventional study

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ABSTRACT

Introduction: Maintaining oral hygiene and handwashing is critical in preschool children for disease prevention; however, limited information exists on the educative value of interventional programs in increasing knowledge among preschool children. The current study evaluated the knowledge and practices of hand and oral hygiene before and after a health educational intervention in preschool settings in Malaysia. **Methodology:** In a cross-sectional interventional study, 168 preschool children from a kindergarten at *Tadika Juju* in Petaling Jaya, Malaysia, were included. A pretest questionnaire evaluated the knowledge across different domains of oral and hand hygiene techniques and habitus, followed by an interactive education intervention. Training was conducted via hands-on demonstration, audiovisual videos, posters, and images (handouts/flyers). The impact of educational intervention on knowledge was evaluated 1 month after the initial training using the same questionnaire as used in the pretest survey. Each evaluation form had 10-graded questions, and the cumulative maximal score that could be attained based on the adequate responses to individual questions was 25. The scoring for each participant was categorized into poor (score: 0–9), average (score: 10–19), and good (score: 20–25) based on their scores for their responses. The difference between the means of pre- and postintervention mean scores across the predefined ratings of poor, average, or good was assessed using a paired t-test. **Results:** Overall, a significant improvement in knowledge on oral health and hand hygiene after the intervention was noted in the study participants ($P < 0.05$). The improvement in mean test scores following intervention was evident across both male and female children. **Conclusion:** Intervention programs should be implemented to increase the awareness and knowledge of preschool children for adequate maintenance of oral and hand hygiene practices, thereby averting the burden of preventable infectious diseases.

Key Words: Handwashing, kindergarten, interventional study, oral hygiene, preschool children

Introduction

Maintaining oral hygiene and handwashing is critical in preschool children for disease prevention [1]. Although oral diseases are largely preventable, dental caries remain a major problem among children. Early intervention aimed at providing good oral hygiene can fairly reduce the occurrence of dental caries [2] and is reflective of general well-being and enhanced quality of life. Several studies have demonstrated better oral health among preschool children in various countries [3-6]. In addition to oral hygiene, handwashing is another critical dimension reflecting general health in preschool children. Handwashing is a simple technique of maintaining hand hygiene that eliminates soil, dust, and other microbes. It is estimated that handwashing using soap alone can reduce approximately 0.5–1.4 million deaths/year. However, such practices are not common among preschool children [7], possibly due to lack of educative iteration in kindergarten teaching curriculums. In Malaysia, limited information is available on the practices of maintaining oral and hand hygiene among preschool children [8]. A link between handwashing and diarrheal diseases is well established, with appropriate handwashing techniques estimated to reduce the risk of diarrheal diseases by 47% and intestinal infections by 48% [9]. As the incidence of infectious etiologies resulting from poor hygienic conditions is on the rise, mostly resulting due to lack of adequate or poor knowledge on implementing correct techniques in handwashing or oral hygiene, it is pertinent to investigate knowledge assessments and implement intervention programs for promoting such practice measures in preschool children. In the current study, we evaluated the knowledge and practices of hand and oral hygiene before and after a health educational intervention in preschool settings in Malaysia.

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Methodology

Study design and participants

A cross-sectional, interventional study was performed among preschool children from a kindergarten at *Tadika Juju* in Petaling Jaya, Malaysia. Children between the ages of 5 and 6 years were selected to participate in the study. Sample size (n) was calculated using the following formula: $n = Z^2 * \frac{P(1-P)}{D^2}$; where Z is the standard normal variate set at 1.96 for a Type I error of 5%; P is the expected proportion utilized from the literature and was 0.58 [10]; and D is the precision of the estimate set at 0.05. Based on these assumptions, the estimated sample size was 374; however, the overall preschool children enrolled in the kindergarten were 168, and therefore, all were recruited for the study. Before the study execution (data collection and intervention), approval from the institutional research committee was obtained.

Study protocol

The preschool children were divided into groups of 10, and each group was assigned a facilitator for evaluating pre- and postintervention knowledge. A pretest knowledge assessment on oral hygiene and handwashing was administered using a questionnaire. The pretest questionnaire was developed by the facilitators and was validated in another preschool kindergarten in the same area (Cronbach's alpha = 0.7) before its utilization in the current study. Informed consent was taken from the principal (head) of the kindergarten. The data were collected by 17 facilitators and supervised by a lecturer from the university. A checklist was used to evaluate the knowledge assessment pertaining to handwashing and oral hygiene. Following the pretest, an intervention was conducted that included training of the study participants regarding appropriate technique of handwashing and toothbrushing. Training was conducted via hands-on demonstration, audiovisual videos, posters, and images (handouts/flyers). Queries concerning these topics among preschoolers were answered.

The impact of educational intervention on knowledge was evaluated 1 month after the initial training using the same questionnaire as used in the pretest survey. Similar subgroups for study participants analogous to the pretest evaluation (groups of 10 each and a facilitator) were utilized to avoid any bias. Subsequently, responses were collected and analyzed from the two evaluation forms (pre and post). The pre- and postintervention evaluation criteria used a checklist for hand hygiene which included knowledge assessments on the technique of handwashing including appropriate methodology, total duration, usage of soap, practices prior and after meals, touching areas labeled in the T-zone (part of the face including forehead, ears, eyes, nose, chin, and perioral region) or the tap after washing, and hand drying techniques. Likewise, evaluation of oral hygiene practices and knowledge assessments were performed across domains of frequency and duration of toothbrushing and oral rinsing, technique utilized, usage of a toothpaste, and frequency of routine dental checkups. Each evaluation form had 10-graded questions, and the cumulative maximal score that could be attained based on adequate responses to individual questions was 25. The scoring for each participant was categorized into poor (score: 0–9), average (score: 10–19), and good (score: 20–25) based on their scores for their responses.

Statistical analysis

Descriptive statistics was utilized for data reporting. Categorical variables were reported as counts and proportions while quantitative variables were reported as means. The difference between the means of pre- and postintervention mean scores across the predefined ratings of poor, average, or good was assessed using a paired *t*-test. All statistical analyses were performed using SPSS version 19 (IBM Corp., Armonk, NY, United States) and $P \leq 0.05$ was deemed statistically significant.

Results

Overall, the handwashing (hand hygiene) scores improved after the pretest intervention. A significant increment in the mean scores was observed following the interactive education intervention. Significant differences in the mean scores assessing knowledge for handwashing techniques were noted across gender ($P < 0.05$) and age ($P < 0.05$). Compared to children aged 5 years, children aged 6 years had relatively higher knowledge as depicted by higher mean scores ($P < 0.05$). For handwashing, the proportion of participants in the poor grading in the pretest questions decreased significantly from over 50% to 33% ($P < 0.05$) [Table 1]. On the contrary, higher proportion of participants scored average or good grades in the postintervention assessments compared to the pretest evaluation. Similar trends in improvement were noted across gender. Likewise, similar trends in knowledge improvement were noted following educational intervention for oral hygiene practices with a significant decline in proportion of children scoring in the poor-score range (19% from 30%; $P < 0.05$) [Table 1].

Discussion

Approximately one-fifth of children between the ages of 5 and 11 years have at least one oral cavity with bacterial manifestation and are predisposed to a preventable heart disease such as infective endocarditis or other cardiovascular problems relating to dental caries [6]. This underscores the importance of maintaining a healthy oral hygiene. The present study highlights the importance of educational interventions in preschoolers to implement appropriate oral and hand hygiene techniques to mitigate preventable infectious diseases.

The diversity of oral health education plays a positive role among the preschool children's oral health, knowledge attitude, and behavior change. It is also well known that dental caries among preschool children is a major public health problem and that good oral hygiene helps the prevention of dental caries

Table 1: Pre- and postscores of oral hygiene and handwashing after health education intervention among the preschoolers

	Preintervention		Postintervention (after 1 month)		*P*
	n (%)	Mean scores	*n* (%)	Mean scores	
Hand hygiene					
Poor	87 (52)	4.2	55 (33)	6.2	<0.05
Average	67 (40)	14.5	76 (45)	16.2	<0.05
Good	14 (8)	22.4	37 (21)	23.3	<0.05
Oral hygiene					
Poor	50 (30)	4.5	32 (19)	6.6	<0.05
Average	85 (51)	14.7	98 (58)	16.8	<0.05
Good	33 (20)	22.0	36 (21)	23.0	>0.05

and diseases of the gums [11]. Our study showed that a simple health education intervention program on oral health improved the knowledge, technique, and the duration of brushing of teeth among preschool children. Similar results were noticed in several other studies where the oral health education program improved the oral health habits among preschoolers after an intervention [12-15]. Primary prevention in the early years, especially before the onset of caries using a systematic approach to dental care for kindergarten children, is beneficial to the society and in terms of socioeconomical aspects.

Handwashing with soap and water reduces the incidence of communicable diseases in children since handwashing removes dirt and microorganisms and thus reduces the incidence of diseases in preschoolers [1]. It is important therefore that guidelines and policies are developed to promote oral health and handwashing techniques among preschool children [16]. In Singapore, the Health Promotion Board holds health education campaigns in over 200 kindergartens on the importance of good oral health. This campaign not only targets the children but also targets the teachers and parents [16]. Hand and oral hygiene remains a key component of the infection control in the reduction of the transmission of viral and resistant bacterial pathogens among preschool children. It is proposed that oral hygiene and hand should be carried out routinely every few months to reduce the common cross-infection among preschool children.

The current study had a few several limitations in addition to those governing the use of interventional, cross-sectional analyses. Specifically, the sample size was small and therefore the ability of the data to project national estimates is questionable. As the study participants were young children, the uncertainty related to accurately answering the questions in the pre- and posttest survey may introduce bias in our estimates. Despite these limitations, qualitative measures in data collection to its utmost accuracy and reliability were instituted by the facilitators.

Conclusion

The study demonstrated a significant improvement in knowledge assessments for oral and hand hygiene practices in preschool children following an interactive educational intervention program. Such intervention programs should be implemented to increase the awareness and knowledge of preschool children for adequate maintenance of oral and hand hygiene practices, thereby averting the burden of preventable infectious diseases.

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Authors' Contributions

NM, HY and MHH were involved in the study design and data analysis. NM, HY, MHH, KR, MAS and WP collected data. HY, MHH, JL, KR and WP were active in manuscript preparation and analysis. All the authors read the final draft and approved.

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Competing Interest

The authors declared that there is no competing interest.

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