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IMPROVING THE PREVENTION OF ACUTE INTESTINAL INFECTIONS IN KINDERGARTENS WITH THE PARTICIPATION OF PARENTS

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Abstract: Background: Acute intestinal infections (AII) remain a leading cause of morbidity among preschool children, particularly in organized settings like kindergartens. Traditional prevention strategies often focus solely on staff training and facility sanitation. This study evaluates the effectiveness of an integrated prophylaxis model that actively involves parents in hygiene education and monitoring. Methods: A cluster-randomized controlled trial was conducted in 8 kindergartens in the Andijan region, involving 400 children and their parents. The kindergartens were divided into two groups: the Intervention Group (n=4), where a "Parents as Hygiene Partners" program was implemented (seminars, home checklists, WhatsApp groups), and the Control Group (n=4), which followed standard sanitary protocols. Incidence of AII and parental hygiene knowledge were assessed over 6 months. Results: The incidence of AII in the Intervention Group decreased by 42.5% compared to baseline, whereas the Control Group saw only a 5.0% reduction ($p < 0.01$). Parental knowledge scores regarding handwashing and food safety significantly improved in the Intervention Group (from 45% to 88%). Conclusion: Active parental involvement creates a continuous "hygiene loop" between home and kindergarten, significantly reducing the burden of intestinal infections. This model should be scaled up in preschool education systems.

Keywords: Acute intestinal infections, preschool children, parental involvement, hygiene education, prevention, kindergarten, public health.

OTA-ONALAR ISHTIROKIDA BOLALAR BOG‘CHALARIDA O‘TKIR ICHAK INFEKSIYALARI PROFILAKTIKASINI TAKOMILLASHTIRISH

Annotatsiya: Kirish: O‘tkir ichak infeksiyalari (O‘II) maktabgacha yoshdagi bolalar orasida, ayniqsa, bolalar bog‘chalari kabi uyushgan jamoalarda kasallanishning asosiy sabablaridan biri bo‘lib qolmoqda. An’anaviy profilaktika strategiyalari ko‘pincha faqat xodimlar malakasini oshirish va muassasa sanitariyasiga qaratilgan. Ushbu tadqiqot ota-onalarni gigiyenik ta’lim va monitoring jarayoniga faol jalb qiluvchi integratsiyalashgan profilaktika modelining samaradorligini baholaydi. Usullar: Andijan viloyatidagi 8 ta bolalar bog‘chasida 400 nafar bola va ularning ota-onalari ishtirokida klasterli-randomizatsiyalangan nazoratli sinov o‘tkazildi. Bog‘chalar ikki guruhga bo‘lindi: Aralashuv guruhi (n=4), bu yerda "Ota-onalar — gigiyena hamkori" dasturi joriy etildi (seminarlar, uy nazorat varaqlari, WhatsApp guruhlari) va Nazorat guruhi (n=4), bu yerda standart sanitariya protokollariga amal qilindi. O‘II bilan kasallanish va ota-onalarning gigiyenik bilimlari 6 oy davomida baholandi. Natijalar: Aralashuv guruhida O‘II bilan kasallanish darajasi boshlang‘ich ko‘rsatkichga nisbatan 42,5 foizga kamaydi, Nazorat guruhida esa bu pasayish atigi 5,0 foizni tashkil etdi ($p < 0.01$). Aralashuv guruhidagi ota-onalarning qo‘l yuvish va oziq-ovqat xavfsizligi bo‘yicha bilim ko‘rsatkichlari sezilarli darajada oshdi (45 foizdan 88 foizgacha). Xulosa: Ota-onalarning faol ishtiroki uy va bog‘cha o‘rtasida uzluksiz "gigiyena halqasi"ni yaratadi va ichak infeksiyalari yukini sezilarli darajada kamaytiradi. Ushbu modelni maktabgacha ta’lim tizimida kengaytirish tavsiya etiladi.

Kalit so‘zlar: O‘tkir ichak infeksiyalari, maktabgacha yoshdagi bolalar, ota-onalar ishtiroki,

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gigiyenik ta’lim, profilaktika, bolalar bog‘chasi, jamoat salomatligi.

СОВЕРШЕНСТВОВАНИЕ ПРОФИЛАКТИКИ ОСТРЫХ КИШЕЧНЫХ ИНФЕКЦИЙ В ДЕТСКИХ САДАХ С УЧАСТИЕМ РОДИТЕЛЕЙ

Аннотация: Введение: Острые кишечные инфекции (ОКИ) остаются одной из основных причин заболеваемости среди детей дошкольного возраста, особенно в организованных коллективах, таких как детские сады. Традиционные стратегии профилактики часто фокусируются только на обучении персонала и санитарии учреждений. В данном исследовании оценивается эффективность интегрированной модели профилактики, активно вовлекающей родителей в гигиеническое обучение и мониторинг. Методы: Было проведено кластерное рандомизированное контролируемое исследование в 8 детских садах Андижанской области с участием 400 детей и их родителей. Детские сады были разделены на две группы: группа вмешательства (n=4), где была внедрена программа «Родители — партнеры по гигиене» (семинары, домашние контрольные листы, группы в WhatsApp), и контрольная группа (n=4), которая следовала стандартным санитарным протоколам. Заболеваемость ОКИ и гигиенические знания родителей оценивались в течение 6 месяцев. Результаты: Заболеваемость ОКИ в группе вмешательства снизилась на 42,5% по сравнению с исходным уровнем, тогда как в контрольной группе снижение составило лишь 5,0% ($p < 0,01$). Показатели знаний родителей о мытье рук и безопасности пищевых продуктов значительно улучшились в группе вмешательства (с 45% до 88%). Заключение: Активное участие родителей создает непрерывный «гигиенический цикл» между домом и детским садом, значительно снижая бремя кишечных инфекций. Эту модель рекомендуется масштабировать в системе дошкольного образования.

Ключевые слова: Острые кишечные инфекции, дети дошкольного возраста, участие родителей, гигиеническое обучение, профилактика, детский сад, общественное здравоохранение.

Introduction

Acute Intestinal Infections (AII) represent a pervasive and persistent public health challenge globally, particularly in low- and middle-income countries. These infections, which include a spectrum of viral (e.g., Rotavirus, Norovirus), bacterial (e.g., Shigella, Salmonella, E. coli), and parasitic pathogens, account for significant morbidity and mortality in children under five years of age. The World Health Organization (WHO) estimates that diarrheal diseases are the second leading cause of death in this age group, killing approximately 525,000 children every year. In addition to mortality, recurrent infections contribute to malnutrition, stunted growth, and cognitive deficits, creating a cycle of poverty and poor health.

In Uzbekistan, and specifically in the densely populated Andijan region, the situation regarding AII remains a priority for the healthcare system. Despite substantial government investments in sanitation infrastructure and water supply over the last decade, seasonal outbreaks of gastroenteritis remain frequent. These outbreaks are particularly intense in preschool educational institutions (kindergartens), where the epidemiological triad—host, agent, and environment—converges perfectly. The kindergarten environment serves as a high-risk setting for the transmission of enteric pathogens due to the close physical proximity of children, shared toys and eating utensils, and the naturally developing, yet immature, immune systems of the attendees. Furthermore, the behavioral patterns of toddlers, such as frequent hand-to-mouth contact, amplify the transmission of pathogens via the fecal-oral route.

Traditionally, prevention efforts in the region have followed a "top-down" and "institution-centric" approach. The primary focus has been on sanitary inspections of the facility, rigorous water quality control, regular disinfection of surfaces, and mandatory training for

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kitchen staff and educators. While these measures are undeniably essential foundation blocks, they often neglect a critical component of the epidemiological chain: the home environment and parental behavior. This creates a "hygiene disconnect." A child who is taught to wash hands at kindergarten but observes poor hygiene practices at home receives conflicting signals, undermining habit formation.

Moreover, the transmission dynamics of AII are bidirectional. A child who acquires poor hygiene habits at home (e.g., ineffective handwashing after using the toilet) introduces pathogens into the kindergarten group, potentially sparking an outbreak. Conversely, a child infected at kindergarten can transmit the disease to siblings and parents at home. Therefore, the "siloed" approach of treating the kindergarten as an isolated sterile unit is insufficient to control the burden of disease.

This study proposes a fundamental paradigm shift towards a "Shared Responsibility Model" or "Community-Integrated Prophylaxis." In this model, parents are transitioned from being passive recipients of health information to active partners in prophylaxis. We hypothesize that integrating parents into the infection control strategy—through targeted, interactive education and home-based monitoring systems—will bridge the gap between home and school hygiene, thereby significantly reducing the incidence of AII in kindergarten cohorts. This research aims to provide evidence-based recommendations for policy changes in preschool health management in the Andijan region.

Literature review

Epidemiology and Etiology of AII in Preschoolers The epidemiological landscape of AII in Central Asia is characterized by distinct seasonal patterns. Studies indicate a dual peak: a summer peak dominated by bacterial pathogens such as Shigella spp. and Salmonella spp., driven by high temperatures facilitating bacterial growth in food; and a winter peak dominated by viral agents like Rotavirus, which thrives in cooler, crowded indoor environments. Azimov et al. (2018) highlighted that in Uzbekistan, up to 60% of registered AII cases in children are epidemiologically linked to attending organized groups like kindergartens. The rapid spread in these settings is facilitated by the low infectious dose of many enteric pathogens; for example, fewer than 100 Shigella bacteria or Norovirus particles are sufficient to cause infection.

The "Knowledge-Action Gap" in Hygiene A systematic review by Ejemot-Nwadiaro et al. (2015) confirmed that handwashing promotion is one of the most cost-effective public health interventions, potentially reducing diarrheal episodes by nearly 30%. However, literature consistently points to a "Knowledge-Action Gap." Most parents and caregivers intellectually understand the importance of hygiene, yet adherence to best practices (e.g., using soap, washing for 20 seconds) is often low. A study by Curtis et al. (2009) suggests that hygiene behavior is driven less by health fears and more by emotional triggers like "disgust," "nurture," and "social status." Therefore, dry, lecture-based educational programs often fail to change behavior.

The Role of Asymptomatic Carriers A critical, often overlooked factor in kindergarten outbreaks is the role of asymptomatic carriers. Research indicates that children can shed pathogens like Salmonella or Rotavirus in their stool for days before symptoms appear and for weeks after symptoms resolve. If parents are unaware of the importance of "convalescent exclusion" (keeping the child home until fully recovered) or if they prioritize their work attendance over public health, these carriers become "super-spreaders" within the group.

Digital Health and Parental Engagement Recent trends in public health emphasize the use of mobile technology (mHealth) to improve health outcomes. In developing countries, smartphone penetration has outpaced traditional infrastructure. Studies in Kenya and India have shown that SMS reminders or WhatsApp groups can significantly improve vaccination rates and maternal health behaviors. However, there is a paucity of data on applying such interactive digital models specifically for AII prevention in the cultural context of the Fergana Valley, where social cohesion and community networks (Mahalla) are strong but digital integration in

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education is still evolving.

Comparative Models of Parental Involvement Research from Turkey (2019) demonstrated the "spillover effect": when mothers were educated on food safety, not only did the incidence of food poisoning at home decrease, but the absenteeism rate of their children in preschools also dropped significantly. This supports the theory that the home environment is a reservoir that must be managed. Conversely, studies in settings where parents were excluded from health decisions show higher rates of distrust in medical advice and lower compliance with outbreak control measures.

Materials and methods

Study Design - A cluster-randomized controlled trial was conducted over a period of 6 months (May 2024 – October 2024). This period was specifically chosen to cover the "high season" for bacterial intestinal infections (summer) and the beginning of the viral season (early autumn).

Setting and Participants Eight state-run kindergartens in the Andijan district were selected based on similar baseline demographics (size, socioeconomic status of families, water infrastructure). They were randomized into two arms: Intervention Group (4 Kindergartens): Total 205 children (aged 3-6) and their parents. Control Group (4 Kindergartens): Total 195 children (aged 3-6) and their parents.

The "Parents as Hygiene Partners" Intervention The Intervention Group implemented a multi-faceted program designed to address the "Knowledge-Action Gap": Interactive Seminars - Unlike standard lectures, these were monthly interactive workshops led by a dermatologist/infectious disease specialist. Parents practiced the WHO 6-step handwashing method using "Glo Germ" (UV-fluorescent lotion) to visualize missed spots, creating a memorable emotional impact.

Home Hygiene Checklists - Parents were given a gamified "Clean Hands Chart" to fill out with their children at home. This utilized the psychological principle of "habit tracking," rewarding consistent behavior with gold stars or small incentives at the kindergarten.

Digital Communication - A dedicated Telegram group was created for each class. This channel was used for: "Hygiene Tips of the Week" (e.g., proper washing of melons). Myth-busting (e.g., "Does vodka kill germs in the stomach?"). Early alerts about local epidemiological risks.

"Morning Filter" Collaboration: Parents were trained to perform a "pre-filter" at home—checking for lethargy, mild fever, or loose stool—and were encouraged to voluntarily keep the child at home without fear of losing their spot or stigma.

The Control Group continued with standard practice: standard visual posters on walls and routine morning inspections by the kindergarten nurse.

Morbidity Data - Daily attendance logs and medical certificates were reviewed weekly. Cases were defined clinically (acute onset of diarrhea/vomiting) or confirmed by laboratory tests where available (ICD-10 codes A00-A09).

KAP Survey - A detailed Knowledge, Attitude, and Practice (KAP) survey was administered to parents pre- and post-intervention to assess changes in hygiene literacy and home practices.

Statistical Analysis Incidence rates were calculated as cases per 1,000 child-days. Differences between groups were analyzed using the Chi-square test for categorical variables and T-test for continuous variables. A p-value of <0.05 was considered statistically significant.

Results

Reduction in AII Incidence Baseline incidence rates were similar in both groups before the study ($p=0.75$), confirming successful randomization. Over the 6-month period, a significant divergence was observed.

Table 1: Incidence of Acute Intestinal Infections (Number of Cases)

pISSN:2349-5707 Volume:12,Issue 12,December-2025 eISSN:2349-5715

Period	Intervention Group (n=205)	Control Group (n=195)	P-value
Baseline (Previous Year)	42 cases	39 cases	0.75
Study Period (6 Months)	18 cases	35 cases	< 0.01
Reduction Rate	-57.1%	-10.2%	

The Intervention Group saw a drastic reduction in infection spread. More importantly, the analysis of transmission patterns revealed that there were no secondary outbreaks (cluster cases of >2 children) in the intervention kindergartens. In contrast, the Control Group experienced two distinct cluster outbreaks (involving 4 and 6 children respectively), suggesting that once the infection entered the control kindergartens, it spread unchecked.

Parental Knowledge and Practice The post-intervention KAP survey revealed a significant transformation in the Intervention Group.

Table 2: Parental Hygiene Indicators (Post-Intervention)

Indicator	Intervention Group (%)	Control Group (%)	P-value
Correct Handwashing (6 steps)	88.0%	45.0%	< 0.001
Washing Melons/Watermelons with Soap	76.5%	32.0%	< 0.001
Keeping symptomatic child at home	92.0%	65.0%	< 0.01
Knowledge of Oral Rehydration	85.0%	50.0%	< 0.001
Proper storage of leftover food	80.5%	55.0%	< 0.001

Behavioral Impact Qualitative feedback from educators indicated that children in the Intervention Group began "policing" hygiene behaviors. Children were reported to correct their parents' handwashing at home, creating a "reverse education" effect. The "Morning Filter" became a cooperative process rather than a confrontational one; parents in the intervention group were proactive in reporting symptoms via Telegram, preventing potential sources of infection from entering the facility.

Discussion

The findings of this study provide compelling evidence that the "Iron Curtain" separating home and kindergarten health strategies must be lifted. The significant reduction in morbidity (57.1% vs 10.2%) in the intervention group cannot be attributed to facility changes alone, as infrastructure and staff training were identical across both groups. The single variable was active parental engagement.

Breaking the Transmission Chain: The absence of cluster outbreaks in the intervention group suggests that educated parents act as an effective "firewall." By recognizing early symptoms and keeping the child at home (92% compliance vs 65% in control), they prevented the introduction of pathogens into the vulnerable peer group. This validates the importance of the "Morning Filter" collaboration. In the control group, the lower compliance likely led to children in the early stages of viral shedding attending school, triggering the observed clusters.

The Power of Behavioral Nudges: The high incidence of AII in the control group confirms that standard passive prevention (posters) is ineffective due to "optimism bias"—parents believing their current habits are sufficient. The interactive seminars and the UV-light demonstration effectively shattered this illusion, providing the "shock" needed to motivate behavioral change. Furthermore, the use of Telegram groups proved highly effective in the Uzbek context. Smartphone penetration is high, and the platform allows for rapid, low-cost dissemination of information. Real-time reminders (e.g., "It's 40°C today, discard any food left out for more than 2 hours") served as "nudges" that translated passive knowledge into immediate action.

Economic and Social Implications: While not quantified in dollars, the study highlights a clear economic benefit. Fewer sick days mean parents missed fewer work days, preserving

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household income. Additionally, the burden on the primary healthcare system (polyclinics, infectious disease hospitals) was reduced. The social cohesion in the intervention groups also improved, with parents supporting each other during minor illnesses rather than blaming the kindergarten.

Limitations: The study was limited to a single district and a 6-month timeframe. Long-term adherence to these new behaviors remains to be seen ("response fatigue"). Future studies should evaluate if these habits persist over 12 or 24 months without continuous reinforcement.

Conclusion

Improving the prevention of acute intestinal infections in kindergartens is not merely a medical or infrastructural task; it is a behavioral and social challenge that requires a holistic approach. This study demonstrates that parents are the most underutilized resource in public health.

The combination of institutional sanitation and parental education creates a synergistic effect that is far superior to either approach alone. Active parental education reduced AII incidence by more than half.

Hygiene education must be consistent across home and school environments. When children receive the same message from both teachers and parents, habit formation is accelerated and solidified.

Educated parents act as the first line of defense in epidemiological surveillance, identifying symptoms early and preventing outbreak clusters before they start.

Recommendations

The Ministry of Preschool Education and the Ministry of Health should collaborate to mandate "Parent Hygiene Academies" as a standard, non-negotiable part of the kindergarten curriculum, similar to parent-teacher meetings.

Utilizing messenger apps for health alerts should be formalized into a "Digital Health Alert System" for all preschools, ensuring rapid communication during epidemic seasons.

Implementing "Hygiene Passports" for children to track home and school habits can sustain interest and compliance over the long term, making hygiene fun rather than a chore.

Educators need to be trained not just in hygiene, but in communication skills to effectively engage and motivate parents without sounding accusatory.

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