Article

Impact of "Respectful Adolescent Care Intervention" on nurses Knowledge, Attitude, and Practice: A Quasi-experimental study*

* This article is derived from the doctoral thesis "A Quasi Experimental Study to Assess the Impact of a Capacity Building Program on Knowledge, Attitude and Practice regrading Respectful Adolescent Care (RAC) among Nurses working in selected healthcare Setting of Delhi" (Amity University, Haryana, Gurugram, Manesar). The full thesis is available at: http://hdl.handle.net/10603/651417.

Anjali Kaushik

https://orcid.org/0000-0001-6782-5742
Faculty of Nursing, Jamia Hamdard University,
New Delhi, India
anjalikaushik@jamiahamdard.ac.in

✉ ***Sunita Srivastava***

https://orcid.org/0000-0002-6019-018X
Institute of Liver & Biliary Sciences, New Delhi, India
sunitasrivastava0405@gmail.com

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Subject: Health promotion, well-being, and quality of life

Contribution to the field: This quasi-experimental study advances nursing knowledge by showing that a structured Respectful Adolescent Care (RAC) intervention significantly improves nurses' knowledge, attitude, and practice (KAP). The findings demonstrate that targeted training enhances nurses' competence in adolescent care, fosters patient-centered approaches, and informs the development of evidence-based clinical guidelines. Additionally, nurse characteristics such as age, experience, and prior in-service training were found to influence KAP gains, providing insights for tailoring future professional development programs.

Abstract

Introduction: About 1.2 million adolescents die each year from preventable causes worldwide. It is worrying that health professionals frequently lack the empathy, skills, and sensitivity to engage with adolescents, often treating them as mere cases. The Respectful Adolescent Care (RAC) intervention can be effectively applied in clinical practice to ensure that adolescents receive compassionate, non-judgmental, and appropriate care as per their unique needs. Using its principles, nurses can create a safe and supportive environment where adolescents feel heard and respected. **Objectives:** To assess the impact of a RAC intervention on nurses' knowledge, attitude, and practice (KAP). Methodology: A quasi-experimental, non-randomized, non-equivalent control group design was adopted. A total of 100 registered nurses meeting the inclusion criteria were selected using a convenience sampling technique. Data was collected using a structured knowledge questionnaire, an attitude rating scale, and a practice observation checklist. Descriptive and inferential statistics were used. **Results:** Most nurses were aged 30-39 years (46% experimental, 38% control) and predominantly female (78% experimental, 62% control). The RAC intervention significantly improved nurses' knowledge (mean 22.1 vs. 16.0; mean diff. 6.1), attitude ($t = 11.44$, $p = 0.001$***), and practice ($\chi^2 = 48.07$, $p = 0.001$***), with 58% achieving good practice; KAP scores were positively correlated (knowledge-attitude $r = 0.38$, knowledge-practice $r = 0.47$, practice-attitude $r = 0.55$; $p = 0.001$***), and gains were significantly associated with age, experience, and prior in-service training. **Conclusion:** The study supports implementing RAC-based guidelines and policies to standardize respectful adolescent care in hospital and community nursing practices.

Keywords (Source: DeCS)
Nurses; adolescent health services; knowledge; attitude; quasi experimental studies; health education.

Impacto de la intervención de Atención Respetuosa al Adolescentes en el conocimiento, la actitud y la práctica de enfermeras y enfermeros: un estudio cuasiexperimental*

* Este artículo se deriva de la tesis doctoral "A Quasi Experimental Study to Assess the Impact of a Capacity Building Program on Knowledge, Attitude and Practice regrading Respectful Adolescent Care (RAC) among Nurses working in selected healthcare Setting of Delhi" (Amity University, Haryana, Gurugram, Manesar). La tesis completa se cuentra disponble en http://hdl.handle.net/10603/651417.

Resumen

Introducción: cerca de 1,2 millones de adolescente muere cada año, a nivel mundial, de causas prevenibles. Es preocupante que los profesionales de la salud con frecuencia no tienen empatía ni habilidades ni sensibilidad para relacionarse con los adolescentes; esto lleva, con frecuencia, a que los traten como meros casos. La intervención de Atención Respetuosa al Adolescente (RAC, por sus siglas en inglés) puede aplicarse de forma efectiva en la práctica clínica para asegurar que los adolescentes reciban una atención compasiva, libre de juicios y apropiada de acuerdo con sus necesidad únicas. Al usar estos principios, los profesionales de enfermería pueden crear ambientes seguros y comprensivos, donde los adolescentes se sientan escuchados y respetados. **Objetivos:** evaluar el impacto de la intervención RAC en el conocimiento, la actitud y la práctica (KAP, por sus siglas en inglés) de profesionales de enfermería. **Metodología:** se adoptó un diseño con grupo de control, cuasiexperimental, no-aleatorio y no-equivalente. Un total de 100 profesionales de enfermería registrados, que cumplieron con los criterios de inclusión, fueron seleccionadas usando la técnica de muestreo por conveniencia. Los datos se recolectaron usando un cuestionario estructurado de conocimiento, una escala de actitud y una lista de chequeo de observación de prácticas. Se usaron estadísticas descriptivas e inferenciales. **Resultados:** la mayoría de los profesionales de enfermería tenía entre 30-39 años (46% experimental, 38% control), y eran predominantemente mujeres (78% experimental, 62% control). La intervención RAC mejoró significativamente el conocimiento (media 22.1 vs. 16.0; media diff. 6.1), la actitud ($t = 11.44$, $p = 0.001$***) y las prácticas ($\chi^2 = 48.07$, $p = 0.001$***) de los profesionales de enfermería —el 58% lograron una buena práctica—; los puntajes del KAP estuvieron positivamente relacionados (conocimiento-actitud $r = 0.38$, conocimiento-práctica $r = 0.47$, práctica-actitud $r = 0.55$; $p = 0.001$***), y las ganancias estuvieron significativamente asociadas con la edad, la experiencia y la formación durante el servicio. **Conclusión:** el estudio apoya la implementación de directrices basadas en la RAC y de políticas para estandarizar la atención respetuosa de los adolescentes en las prácticas hospitalarias y de las enfermeras comunitarias.

Palabras clave (Fuente DeCS)
Enfermeras y enfermeros; servicios de salud del adolescente; conocimiento; actitud; estudios cuasiexperimentales; educación en salud.

Impacto da intervenção da Atenção Respeitosa ao Adolescente no conhecimento, atitude e prática de enfermeiras e enfermeiros: estudo quase experimental*

** Este artigo foi derivado da tese de doutorado intitulada "Um estudo quase experimental para avaliar o impacto de um programa de capacitação no conhecimento, atitude e prática de avaliação da atenção respeitosa ao adolescente (RAC) entre enfermeiros que trabalham em ambientes de saúde selecionados de Delhi" (Amity University, Haryana, Gurugram, Manesar). A tese na íntegra se encontra disponível em http://hdl.handle.net/10603/651417

Resumo

Introdução: Cerca de 1,2 milhão de adolescentes morrem a cada ano no mundo por causas preveníveis. Nesse contexto, é preocupante que os profissionais de saúde frequentemente carecem de empatia, habilidades e sensibilidade para se relacionar com adolescentes. Isso leva, muitas vezes, a que sejam tratados como meros casos. A intervenção da Atenção Respeitosa ao Adolescente (RAC, em inglês) pode ser aplicada de forma eficaz na prática clínica para garantir que os adolescentes recebam cuidados humanizados, sem julgamentos e adequados, de acordo com suas necessidades únicas. Ao usar esses princípios, as e os profissionais de enfermagem podem criar ambientes seguros e acolhedores, onde os adolescentes se sintam ouvidos e respeitados. **Objetivo:** avaliar o impacto da intervenção RAC no conhecimento, atitude e prática (KAP, em inglês) das e dos profissionais de enfermagem. **Metodologia:** Foi adotado um desenho de grupo controle quase experimental, não aleatório e não equivalente. Um total de 100 profissionais de enfermagem habilitados, que atenderam aos critérios de inclusão, foram selecionados a partir da técnica de amostragem por conveniência. Os dados foram coletados usando um questionário estruturado de conhecimento, uma escala de atitude e uma lista de verificação de observação de práticas. Foram utilizadas estatísticas descritivas e inferenciais. **Resultados:** A maioria dos profissionais de enfermagem tinha entre 30 e 39 anos (46 % experimentais, 38 % controlados) e eram predominantemente mulheres (78 % experimentais, 62 % controlados). A intervenção RAC melhorou significativamente o conhecimento (média 22,1 vs. 16,0; média diferencial 6,1), atitude ($t = 11,44$, $p = 0,001$***) e práticas ($\chi^2 = 48,07$, $p = 0,001$***) das e dos profissionais de enfermagem (58 % alcançaram boas práticas); as pontuações KAP foram positivamente relacionadas (conhecimento-atitude $r = 0,38$; conhecimento-prática $r = 0,47$; prática-atitude $r = 0,55$; $p = 0,001$***), e os ganhos foram significativamente associados à idade, à experiência e ao treinamento em serviço. **Conclusão:** O estudo apoia a implementação de diretrizes e políticas baseadas em RAC para padronizar a atenção a essa população nas práticas hospitalares e na enfermagem na atenção comunitária.

Palavras-chave (Fonte DeCS)

Enfermeiras e enfermeiros; serviços de saúde de adolescentes; conhecimento; atitude; estudos quase experimentais; educação em saúde.

Introduction

Adolescence is a critical stage of life marked by rapid physical, psychological, and social changes. During this period, individuals explore interests, develop expertise, and make important career choices. Health-related behaviors adopted in adolescence strongly influence future well-being. Positive habits—such as healthy eating, exercise, and safe practices—promote a productive life, whereas risky behaviors like smoking, substance abuse, unsafe sexual practices, and poor lifestyle choices can have long-term adverse effects. Due to improvements in child survival over the past decade, the adolescent population has grown significantly, particularly in low- and middle-income countries. According to the United Nations Population Fund, 24% of the Indian population is aged 0-14 years, 17% is aged 10-19 years, and 26% is aged 10-24 years, highlighting a considerable percentage of adolescents in India and the importance of addressing their needs (1).

In low-income countries, where 90% of the world's adolescents live, the risk of Human Immunodeficiency Virus (HIV) infection remains high, yet this population is the least likely to access treatment (2). Despite advances in medical care, adolescents still face barriers to essential information, quality services, and protective environments. Every year, an estimated 1.2 million adolescents die, mostly from preventable causes (3).

Adolescents often struggle when seeking care in healthcare settings, as they are neither children nor adults. Many report delays in attention, unmet needs, and even mistreatment by the healthcare professionals. For example, a cross-sectional study of adolescents in Shiraz, Iran (ages 13-19), found that over half of the sample perceived a need for mental health services, yet only approximately 12% of those who needed care felt their needs were fully met; many reported structural or attitudinal barriers, including reluctance to seek help or not receiving help when they asked (4). Similarly, studies in Asia and Europe have shown that while many adolescents consider or seek informal help, very few access formal health services, with less than 7% reporting formal help-seeking even in high-income countries (5). In rural areas of the United States, around 20% of adolescents reported an unmet health need, with barriers including access difficulties, parental issues, anxiety, and lack of confidentiality (6). Negative comments, harsh behavior, or lack of empathy from health professionals not only discourage follow-up but also create a poor image of the health system. In the systematic review "Experiences of Care for Adolescents with Mental Health Difficulties in Acute Paediatric Services" (2025), adolescents and families frequently described unsupportive interpersonal interactions, inadequate attention, and a lack of sensitivity from health professionals (7). Another study in Nigeria, which assessed adolescent-responsive sexual and reproductive health services, found that many health workers did not sufficiently uphold confidentiality or engage ado-

lescents respectfully; non-judgmental attitudes were lacking, and policy/practice gaps existed (8).

Respectful Adolescent Care (RAC) emphasizes treating adolescents as unique individuals, acknowledging their dignity, autonomy, and preferences. Unfortunately, many health professionals lack the skills or sensitivity to provide such care, often perceiving adolescents merely as cases rather than individuals in need of understanding. Evidence from a systematic review of respectful maternity care interventions shows that adolescents giving birth often experience verbal abuse, poor communication, and lack of privacy; however, interventions including provider training, policy shifts, and facility changes were shown to improve satisfaction and reduce mistreatment (9). Likewise, a global review on healthcare providers' responses to adolescent survivors of sexual abuse highlighted inconsistent, inadequate, and sometimes insensitive responses, reinforcing the need for training in respectful, adolescent-responsive care (10).

Nurses, being the largest and most trusted group of health professionals, play a crucial role in shaping adolescent health experiences. Their compassion and empathy can significantly influence recovery and trust in the healthcare system. Recognizing this, the World Health Organisation (WHO) and the United Nations International Children's Emergency Fund (UNICEF) have promoted Adolescent-Friendly Health Services that prioritize respect, non-discrimination, and protection of adolescents' rights.

Despite growing global recognition of adolescent-friendly and respectful healthcare, existing literature largely focuses on adolescents' experiences and service-level barriers, with comparatively limited attention to the knowledge, attitudes, and practices of the service providers as nurses who are central to adolescent care delivery. While international guidelines emphasize the significance of respectful, adolescent-responsive care, there is a paucity of interventional studies evaluating the effectiveness of structured educational or training programs for nurses in improving respectful adolescent care. This gap is particularly evident in low- and middle-income countries, including India, where adolescents constitute a substantial proportion of the population and healthcare systems face resource and training constraints. Addressing this gap is crucial for strengthening nursing practices, improving the way adolescents get healthcare, and ultimately enhancing health outcomes.

Objectives

1. To assess the impact of a RAC training on nurses' knowledge, attitude, and practice (KAP).
2. To explore the relationship and associations between KAP scores with the selected demographic variables in the experimental group.

Null Hypothesis

H_{01}- The RAC training intervention has no significant effect on nurses' KAP scores.

H_{02}- There is no significant association between KAP scores with selected demographic variables.

Materials and Methods

Study design: A quantitative non-randomized, non-equivalent control group pretest-posttest design was adopted.

Study setting: The study was conducted in the pediatric units of two purposively selected tertiary care hospitals. The allocation of the experimental and control groups among the two hospitals was done using the lottery method, where one hospital was assigned as the experimental and the other as the control setting.

Sample size and technique: The sample size was calculated based on a previous study where the nurses' knowledge of adolescent care was 65.8% (11). The sample size was calculated to detect a 22% improvement compared with the control group, with a study power of 80% (β = 20%) and a 95% confidence level (α = 5%). The calculated sample size was 49 participants per group, which was rounded off to 50 nurses each, in the experimental and control groups. Convenience sampling was used to recruit participants who met the eligibility criteria. The eligibility criteria included nurses who were willing to participate, available and providing care to adolescents at the time of data collection.

Participant flow text as per TREND guidelines of reporting: A total of 120 nurses were assessed for eligibility from two purposively selected tertiary care hospitals, which served as the units of assignment. Sixty participants were screened in each hospital, of whom 20 (10 from each hospital) did not meet the eligibility criteria and were excluded. The remaining 100 nurses were allocated based on hospital setting to the experimental (n = 50) and the control groups (n = 50). The experimental group underwent a pre-test on Day 1 followed by a structured intervention delivered over three consecutive days, whereas the control group received routine care and was followed up for 10 days (post-test). No attrition was observed in either group, and all participants were included in the final analysis.

The research variables included: RAC intervention, knowledge, attitude, and practice. RAC intervention refers to a structured program delivered with the help of audiovisual aids by the primary researcher, focusing on respect, protection, and fulfilment of adolescents' rights to information, privacy, confidentiality, non-discrimination, and the provision of services in a non-judgmental manner by healthcare professionals.

Knowledge refers to nurses' understanding of the RAC, encompassing factual information as well as the ability to apply this knowledge in day-to-day clinical practice. Knowledge was measured using a structured knowledge questionnaire; attitude refers to nurses' views, values, and beliefs toward the RAC and was measured using a structured 5-point Likert rating scale; and practice refers to the observable practices of nurses related to RAC and was assessed by an independent assessor using a structured practice observation checklist.

Tools and Intervention

Data was collected using three structured tools developed and validated by 7 experts from the fields of pediatric nursing (4), adolescent health (2), and psychology (1).

Tool 1: Structured Knowledge Questionnaire. It contained demographic details of the participants and 25 items on Knowledge, which refers to the correct understanding of the RAC by participants. The total knowledge score for each participant was obtained by adding the correct answers to the 25 items. Based on Bloom's cut-off criteria (10), the total knowledge score of 25 was converted into percentage scores and categorized as poor knowledge (0-13; ≤50%), average knowledge (14-20; 51-80%), and good knowledge (21-25; >80%). Reliability using the test-retest method (r= 0.84) demonstrated good reliability.

Tool 2: Attitude scale. It was prepared by the researcher and validated by 7 experts. Contained 20 items, measured using a 5-point Likert scale (Range 20-100), which varied from Strongly Disagree (1) to Strongly Agree (5). The reverse scoring for unfavorable items was also done. The total attitude score was converted into percentage scores and interpreted based on Bloom's cut-off criteria (10), attitude scores ranging from 20 to 100 were categorized as less favorable attitude (20-50; ≤50%), moderately favorable attitude (51-80; 51-80%), and more favorable attitude (81-100; >80%). The internal consistency was good (Cronbach's alpha, α=0.80).

Tool 3: Structured Observation Checklist. It was prepared by the researcher and validated by the experts. It had 20 items. Each correct practice was scored "1," and incorrect ones as "0" (range 0-20). The total practice scores were also added and converted into percentages, and interpreted based on Bloom's cut-off criteria (10). The scoring categories were 0-10; ≤50%= Poor, 11-16; ≥51-80% = Average, 17-20;>80% = Good practice. Inter-rater reliability was assessed (κ= 0.86).

Intervention. A RAC training intervention was developed based on the WHO Global Standards (2015), relevant literature, and experts' input. It aimed to sensitize nurses to the unique char-

acteristics and needs of adolescents and to promote the provision of respectful, empathetic, non-discriminatory, and adolescent-responsive care. The draft of the intervention was reviewed by a panel of seven subject experts. Based on their feedback, necessary modifications were made, and consensus was achieved among all seven experts regarding the content, clarity, relevance, and feasibility of the intervention. The elements used to construct the intervention included:

- Day 1. Introduction of adolescence and its implications for public health, Fundamentals of adolescent Physical, social and emotional health and development, communication techniques, sexual and reproductive health, adolescent-friendly health services (AFHS) (12-17).
- Day 2. Nutrition, mental health, how to invest in their health, guiding concepts for adolescent health, policies and the role of healthcare providers in meeting the needs of adolescent health with acute and chronic illness (13-15, 17, 18).
- Day 3. RAC concept, objectives, components, difference between respectful and non-respectful care, concept of putting adolescents at the center, competencies for implementation of Global standards for Quality healthcare services for adolescents (13-17).

The intervention was delivered by the primary researcher, who is trained in adolescent health and nursing education, during three consecutive days for the experimental group (n = 50). Each session lasted 1.5 hours and was conducted from 11:00 a.m. to 12:30 p.m., resulting in a total intervention duration of 4.5 hours. The teaching-learning methods included interactive discussions, case vignettes, and PowerPoint-assisted presentations.

Data collection and assessment. Data were collected from two separate settings to minimize contamination between groups. The experimental group was recruited from Kalawati Saran Children's Hospital during November and December 2022, and the control group was recruited from Swami Dayanand Hospital during January and February 2022.

The intervention was delivered to the experimental group by the primary researcher. The assessment was done twice: pretest (day 1) and post-test (day 10) by the primary researcher. Due to the nature of the educational intervention, participants could not be blinded to group allocation. To minimize bias, outcome assessment for KAP was conducted by an independent observer who was blinded to group allocation. Efforts to prevent contamination included scheduling sessions separately and instructing participants not to share intervention content with colleagues until the study was completed. The control group received the intervention after the completion of data collection.

Data analysis and interpretation: Data were analyzed using SPSS, version 22, STATA (version 10) and Epi Info (version 3.5.1) statistical software. As the data were collected directly by the researcher, all questionnaires and observation checklists were completed in full, with no missing data.

Ethical Considerations

Approval was obtained from the Institutional Ethics Committee, Lady Harding Medical College and Associated Hospitals (LHMC/IEC/2021/03/100), and informed written consent was taken from all the nurses and adolescents and their parents. All the principles as per the Declaration of Helsinki were followed.

Results

Table 1. Frequency and Percentage Distribution of Participants as per Their Sociodemographic Variables

$n_1 + n_{2=} 100$

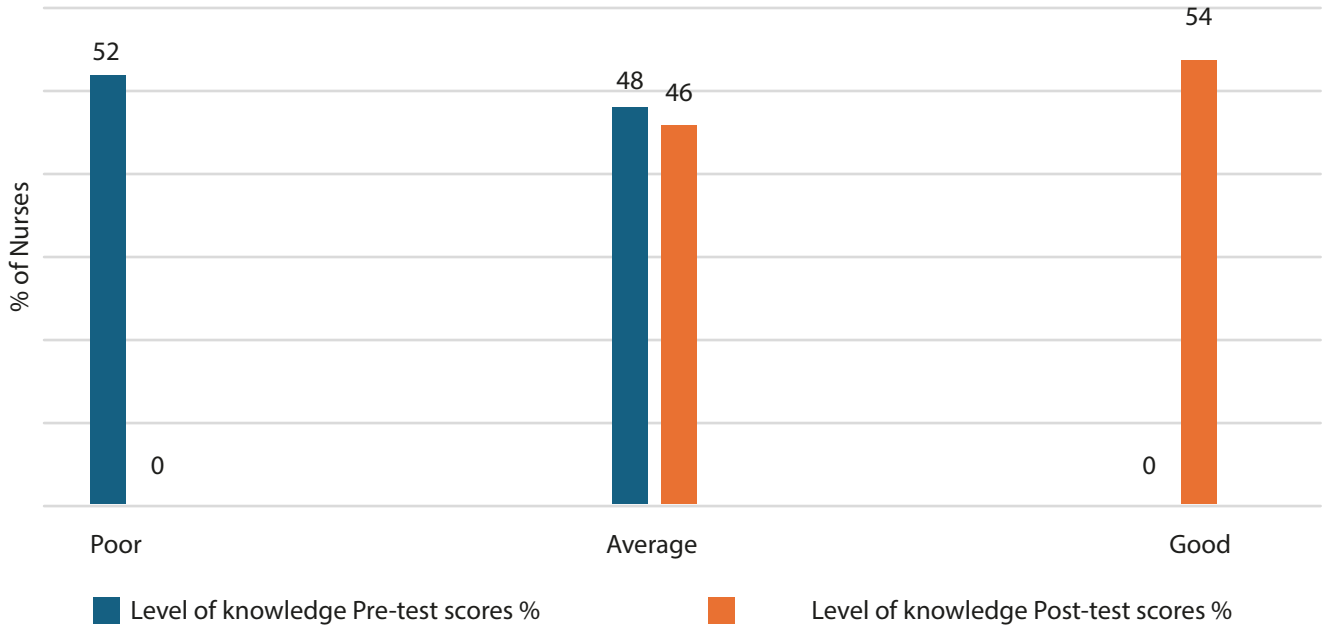
Sociodemographic variables		Group				Chi square test (χ2)	P value
		Experimental (n_1=50)		Control (n_2=50)			
		N	%	n	%		
Age (years)	20-29	14	28.00	11	22.00	2.23	0.33
	30–39	23	46.00	19	38.00		
	40 and above	13	26.00	20	40.00		
Sex	Female	39	78.00	31	62.00	3.05	0.08
	Male	11	22.00	19	38.00		
Qualification	DGNM	21	42.00	32	64.00	5.28	0.15
	PBSc (N)	3	6.00	3	6.00		
	B. Sc(N)	20	40.00	12	24.00		
	M. Sc (N)	6	12.00	3	6.00		
Experience (years)	0 -4	10	20.00	7	14.00	3.30	0.51
	5 -9	13	26.00	11	22.00		
	10 -14	13	26.00	10	20.00		
	15 -19	11	22.00	15	30.00		
	> 19	3	6.00	7	14.00		
Marital status	Single	11	22.00	10	20.00	0.06	0.81
	Married	39	78.00	40	80.00		
	Others	0	0.00	0	0.00		
Awareness on RAC	Yes	19	38.00	14	28.00	1.13	0.29
	No	31	62.00	36	72.00		
Former Training on RAC	Yes	12	24.00	7	14.00	1.62	0.20
	No	38	76	43	86.00		

DGNM- Diploma in General Nursing and Midwifery; PBBSC- Post Basic Bachelor of Science (Nursing), BSc(N)- Bachelors of Science (Nursing), MSc (n) – Masters of Science in Nursing;

Source: Prepared by the authors.

Most nurses were aged between 30 and 39 years (46% experimental, 38% control), with females predominating in both groups (78% experimental, 62% control; p = 0.08); diploma in General Nursing (DGNM) was more common in the control group (64%) than in the experimental group (42%). Experience and marital status were similarly distributed across groups. Only about one-third of nurses had prior awareness of RAC (38% experimental, 28% control), and few had attended in-service education on RAC (24% experimental, 14% control) (See Table 1).

Figure 1. Comparison of Pre and Post-test Knowledge Levels based on Bloom's Criteria among nurses (Experimental Group)



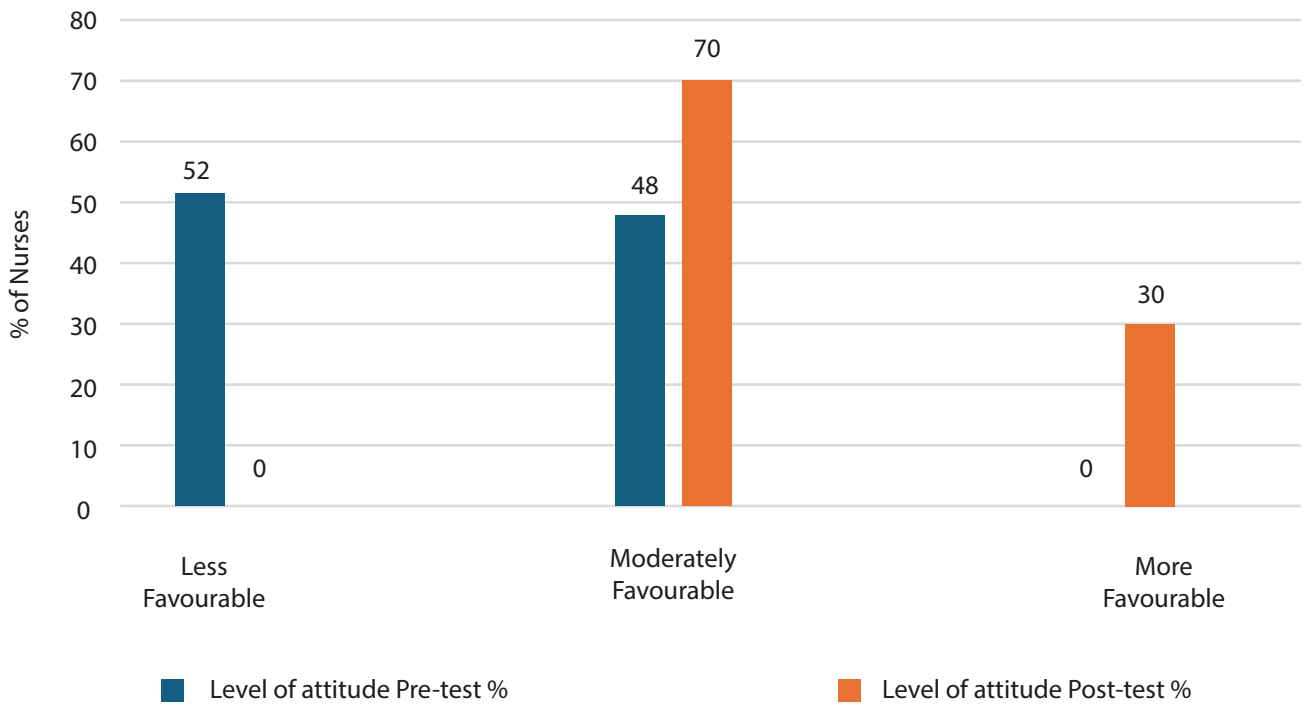
Source: Prepared by the authors.

Figure 1 shows a categorical shift of more than half (54.0%) regarding good knowledge of RAC, compared to the 48% in the average Knowledge category. This difference was highly significant using McNemar's test ($\chi 2 = 37.46$, p=0.001***).

Figure 2 shows a categorical shift in attitude levels, with more than half (52%) showing a less favorable attitude pre-test to a more favorable attitude post-intervention. This difference was evaluated to be highly significant using the Chi-Square Test ($\chi 2 = 25.35$, p=0.001***).

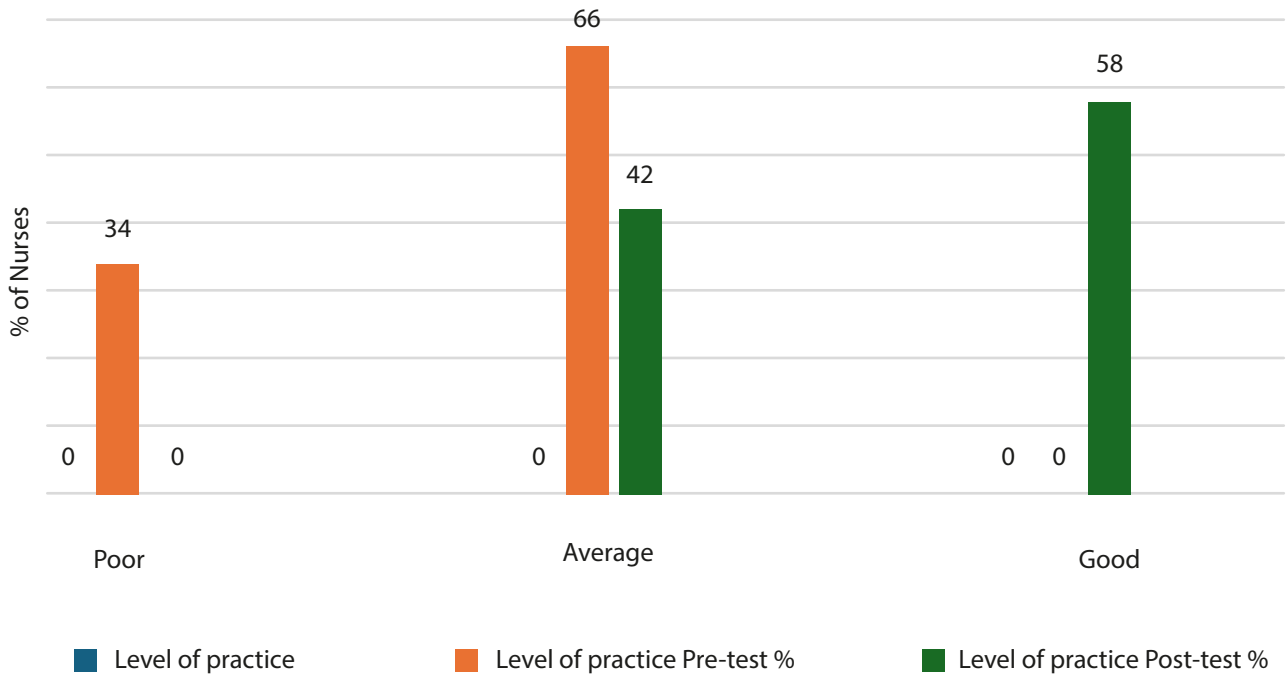
Figure 3 shows a category improvement in Practice levels of the experimental group, where no nurses remained in poor practice, 42% demonstrated average practice, and 58% attained good practice. This difference was highly significant using the Chi-Square test ($\chi 2 = 33.50$, p=0.001***).

Figure 2. Comparison of Pre and Post-Test Attitude Levels Based on Bloom's Criteria among Nurses (Experimental Group)



Source: Prepared by the authors.

Figure 3. Comparison of pre and post-test attitude levels based on Bloom's criteria among nurses (experimental group)



Source: Prepare by the authors.

Table 2. Category wise Comparison of Post-Test Knowledge Scores of Nurses on RAC (Experimental v/s control group)

$n_1+n_2=50+50$

Level of knowledge	Group				Chi square test (χ2)	P value
	Experimental (n1)		Control (n2)			
	f	%	f	%		
Poor Knowledge (0-13) <50%	0	0.0	23	46.0	**50.32**	**0.001*** **
Average Knowledge (14-20) 51-80%	23	46.0	27	54.0		
Good Knowledge (21-25) >80%	27	54.0	0	0.0		

***p≤0.001 highly significant

Source: Prepared by the authors.

Table 3. Comparison of Knowledge Scores of Nurses on RAC (Experimental v/s Control)

$n_1+n_2=50+50$

Assessment	Experimental (n1=50)		Control (n2=50)		Mean difference	Student independent t-test (t)	Cohen's d	95%CI	P value
	Mean	SD	Mean	SD					
Pre-test scores	15.6	2.6	15.3	1.9	0.2	0.52	0.1317	[-0.2607, 0.5242]	0.61
Post-test scores	22.1	1.5	16.0	1.9	6.1	16.93	3.5637	[2.9292, 4.1981]	0.001***

***p≤0.001 highly significant

Source: Prepared by the authors.

Table 3 shows that pre-test Knowledge scores were similar in both groups, with no significant difference. Post-test scores were higher in the experimental group (mean 22.1) than in the control group (mean 16.0), showing a significant difference (mean diff. 6.1).

Table 4. Comparison of Post-Test Level of Attitude Scores on RAC among Nurses (Experimental v/s Control)

$n_1+n_2=50+50$

Level of attitude	Group				Chi square test (χ2)	P value
	Experimental (n1)		Control (n2)			
	f	%	f	%		
Less favourable attitude (20-50); ≤50%	0	0.0	21	42.0	11.27	0.01**
Moderately Favourable (51-80);51-80%	35	70.0	29	58.0		
More favourable (81-100); >80%	15	30.0	0	0.0		

**p≤0.01 highly significant

Source: Prepared by the authors.

Table 5. Comparison of Pre- and Post-Test Attitude Score on RAC among Nurses (Experimental v/s Control)

$n_1+n_2=50+50$

Assessments	Experimental (n1=50)		Control (n2=50)		Mean difference	Cohen's d	95% CI	Student independent t-test (t)	P value
	Mean	SD	Mean	SD					
Pre-test	50.4	7.6	49.9	7.1	0.5	0.068	[-0.3241, 0.4601]	0.36	0.72
Post-test	68.3	8.1	51.2	6.6	17.0	2.3145	[1.8059, 2.8231]	11.44	0.001***

***p≤0.001 highly significant

Source: Prepared by the authors.

Table 5 shows no significant difference in pre-test attitude scores, but post-test scores were significantly higher in the experimental group (t=11.44, p=0.001***).

Table 6. Comparison of Post-Test Practice Score on RAC among Nurses (Experimental v/s Control)

$n_1+n_2=50+50$

Level of Practice	Group				Chi square test ($\chi 2$)	P value
	Experimental		Control			
	F	%	f	%		
Poor (0-10); ≤50%	0	0.0	16	32.0	48.07	0.001***
Average (11-16);51-80%	21	42.0	34	68.0		
Good (17-20); >80%	29	58.0	0	0.0		

***p≤0.01 high significant

Source: Prepared by the authors.

In the pre-test practice scores, between the experimental and control groups, no significant differences were observed (χ^2=1.05, p=0.31). However, the post-test (Table 13) shows a highly significant improvement in post-test Practice scores (Table 9) in the experimental group compared to the control (χ^2=48.07, p=0.001***).

Table 7. Comparison of Pre- and Post-Test Practice Scores on RAC among Nurses (Experimental v/s Control)

$n_1+n_2=50+50$

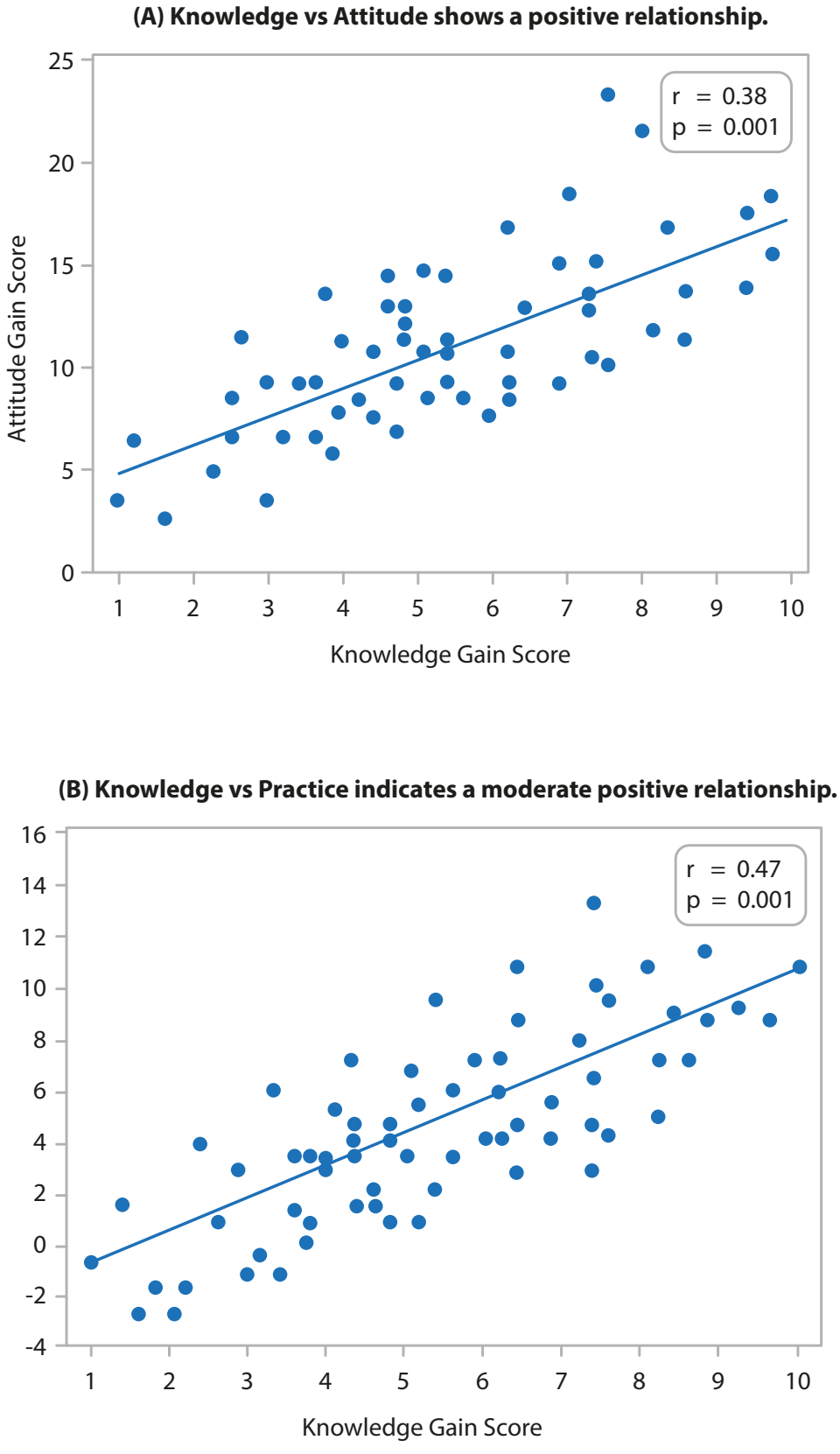
Assessments	Experimental (n1)		Control (n2)		Mean difference	Student independent t-test	P value
	Mean	SD	Mean	SD			
Pre-test	11.5	2.3	11.1	2.1	0.3	0.76	0.45
Post-test	15.8	1.9	11.8	2.6	3.9	8.51	0.001***

***p≤0.001 highly significant

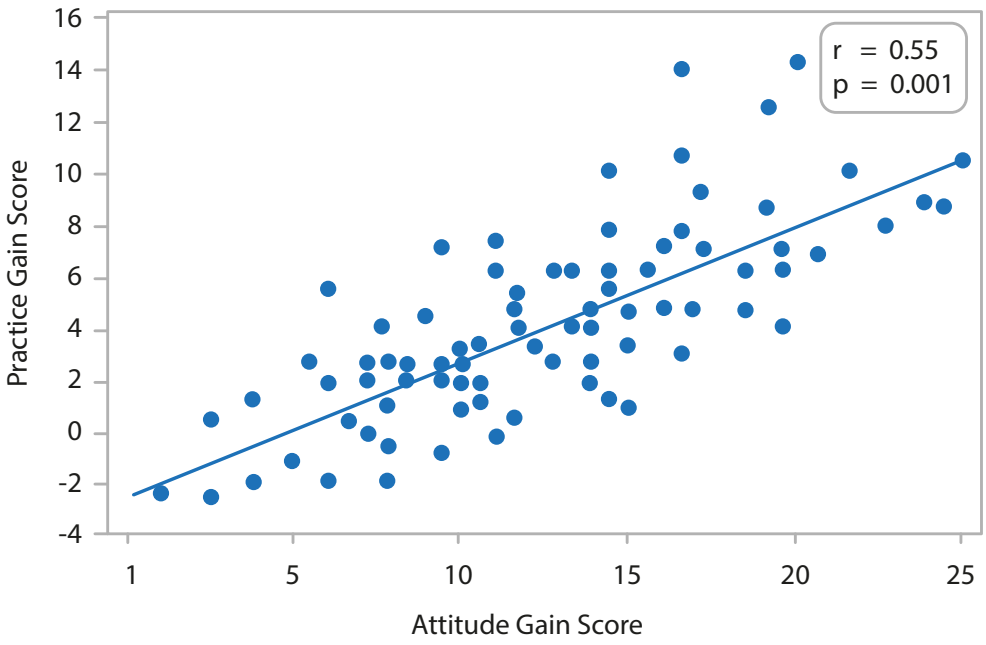
Source: Prepared by the authors.

Table 7 shows no significant difference in pre-test Practice scores, but post-test scores were significantly higher in the experimental group (t=8.51, p=0.001***).

Figure 4. Correlation Between Knowledge, Attitude, and Practice among Nurses in Experimental Group



(C) Attitude vs Practice demonstrates a positive relationship.



Source: Prepared by the authors.

Figure 4 shows a positive and highly significant correlation (p=0.001*) between the study variables. Knowledge shows a moderate positive relationship with Attitude(r=0.38) and with Practice (r=0.47), indicating that higher Knowledge scores are associated with favorable attitudes and better practices. Practice exhibits a moderate-to-strong positive correlation with Attitude (r = 0.55), suggesting that improved practices are closely aligned with favorable attitudes.

On determining the associations between Knowledge gain, Attitude and Practice scores in the experimental group, Knowledge gain scores were significantly associated with age (F=3.20, p=0.05) and attending prior in-service training (t=2.73, p=0.01). The Attitude scores are significantly associated with age (F=3.30, p=0.05) and years of experience (F=2.58, p=0.05). The Practice scores were significantly associated with age (F=3.59, p=0.05) and years of experience (F=2.62, p=0.05).

Discussion

The present study aimed to assess the impact of RAC training intervention on nurses' KAP. A similar study evaluating the effect of a capacity-building program for nursing staff reported post-intervention improvements of 18.3% in Knowledge, 7.2% in Attitude, and 6.5% in Practice scores (19). These findings are consistent with the present study, where the mean difference between pre- and post-test scores was 6.5 in Knowledge, 17.8 in Attitude, and 4.2 in Practice. Although the control group had slightly lower pre-test scores, the difference was statistically

non-significant and minimal; therefore, the greater post-test improvement in the experimental group can be attributed to the intervention rather than baseline disadvantage.

The study also highlighted that nurses had limited baseline KAP regarding RAC. This is the first study to specifically assess and enhance KAP on RAC among nurses through structured training. Previous studies have also demonstrated the role of interventions in improving KAP. For instance, Tshitenge in a study reported that healthcare providers had limited knowledge about new contraceptives and lacked confidence in prescribing them to adolescents (20). Similarly, a systematic review by Chilinda et al. revealed that unprofessional attitudes and inadequate knowledge among healthcare providers restricted adolescents' access to reproductive health services in developing countries (21). Both studies strongly emphasized the need for training healthcare providers, particularly nurses, to deliver RAC and ensure youth-friendly reproductive health services for improved service uptake among adolescents.

In a cross-sectional survey conducted by Gausman J, among 258 doctors, nurses, social workers, and counsellors, post-training scores showed improved knowledge, skills, and attitudes, particularly among doctors and nurses (19). The present study demonstrated consistent results. Similarly, Noreen D.N. et al. evaluated the impact of capacity-building training for healthcare workers at points of entry and reported a significant improvement in knowledge, along with positive changes in practice (22). In line with these findings, the present study also revealed a significant improvement in the pre- to post-test KAP scores of nurses in the experimental group.

Another study, which assessed KAP of 1,707 health professionals in Guinea regarding adolescent contraceptive use, found that 71% had good knowledge, 62% positive attitudes, and 41% good prescribing practices (23). In contrast, the present study revealed inadequate pre-test knowledge, unfavorable attitudes, and poor practice among nurses regarding RAC. However, post-intervention, significant improvements were observed in their knowledge, attitude, and practice scores.

Abayneh et al. in a study reported significant associations between respondents' profession, educational level, type of working institution, and prior training (24). The present study revealed similar findings, showing associations with age, educational qualification, and years of experience. Likewise, another study found a significant association between nurses' knowledge and their age, marital status, and qualification (25). The findings of the current study are also consistent with those of Mohamed H.M. et al (26).

Findings of the present study regarding the correlation between nurses' KAP are consistent with the findings of a study done by Else-

bai et al., which revealed that there was a statistically significant positive correlation between nurses' knowledge and their practice (25). Additionally, the results of the present study are in concordance with the findings of Hamed and Yassein's study, who clarified there was a significant statistically positive correlation between nurses' knowledge and their practice (27).

The findings of the present study did not coincide with the findings of a study done by Ross et al. and Elboray et al., where no correlation was found between the KAP of healthcare providers (28, 29).

Limitations: The use of non-probability convenience sampling may have introduced sampling bias. This limits the representativeness of the sample and restricts the generalizability of the findings. The absence of long-term follow-up limits the ability to generalize the results and to assess the sustained impact of the intervention.

Implications and Future Research Directions

The findings emphasize the need to incorporate adolescent care principles into undergraduate nursing practice, curricula, in-service education, and continuing nursing education programs. Implementation of such training initiatives will develop an adolescent-competent nursing workforce. Future research may focus on replicating the study with larger samples in multiple settings to enhance generalizability. Long-term follow-up studies are recommended to assess the sustainability of training effects. Further research using randomized controlled designs, comparative teaching strategies, and qualitative approaches may provide deeper insights.

Conclusion

Adolescents undergo rapid and complex physical as well as psychosocial development, which poses unique communication and management challenges, making RAC essential for all healthcare workers. As a relatively new concept, this study revealed that nurses' KAP regarding RAC were initially inadequate but improved significantly following training. It is therefore recommended that RAC be incorporated into routine practice across all healthcare settings.

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Data availability statement: The data that support the findings of this study are available from the corresponding author upon reasonable request in accordance with ethical guidelines and participant confidentiality.

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