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Original Research Article

Exploring adult vaccination awareness and practice: a cross-sectional study of knowledge, attitudes and immunization practices among postgraduates and interns at a tertiary care hospital

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ABSTRACT

Background: Adult vaccination is an important part of disease prevention, but it is often not given enough attention, especially in developing countries like India. Many effective vaccines are available for adults, such as those for influenza, hepatitis B, and HPV, yet awareness and use of these vaccines remain low. Healthcare professionals, including interns and postgraduate students, have a key role in promoting vaccination among the public. Studying their knowledge, attitude, and practice (KAP) toward adult vaccination helps to find existing gaps and improve future vaccination programs.

Methods: Predesigned and validated questionnaires were given to post graduates and Interns of the hospital. The KAP questionnaire which include 22 questions, out of these 8 questions are regarding knowledge, 7 for attitude, 5 for practice and 2 questions regarding barriers/facilitators to vaccination. The questionnaire was distributed to the participants electronically via google forms with digital informed consent, and their responses were collected and analyzed, results were expressed in frequencies and percentages.

Results: Among 106 participants, 56 (52.8%) were females and 50 (47.2%) were males. All were postgraduate trainees and interns. About 71.7% knew that a separate adult vaccination schedule exists. Most participants agreed that adult vaccination is important, and many (66.7%) strongly agreed. Most (94.3%) had received at least one adult vaccine such as COVID-19 or Hepatitis B, and 76.5% had recommended vaccines to patients. However, some barriers like lack of awareness, time limits, and unclear institutional guidelines were noted.

Conclusions: Overall, the study found good knowledge and a positive attitude toward adult vaccination among postgraduates and interns. Yet, some gaps remain in practical implementation and patient guidance. More structured training sessions, awareness programs, and clear hospital policies can help improve adult vaccination practices among healthcare workers.

Keywords: Adult vaccination, Attitude, Interns, Knowledge, Practice, Postgraduates

INTRODUCTION

Immunization is universally recognized as one of the most successful and cost-effective public health interventions in history.¹ Yet, while childhood vaccination programs are exceptionally robust, adult vaccination remains deeply underutilized, especially in developing countries like India, where coverage is estimated at less than 2%.^{2,3} This

imbalance creates a massive public health gap, particularly as India's population ages and faces a rising burden of chronic health conditions. While international bodies like the Centres for Disease Control and Prevention (CDC) provide clear adult schedules for routine vaccines such as influenza, Tdap, pneumococcal, human papillomavirus (HPV), and hepatitis B national policies in India, including the Universal Immunization Programme (UIP) and

Mission Indradhanush, have historically focused almost entirely on children and pregnant women.⁴⁻⁷ This fragmentation leaves a large portion of the adult population vulnerable to severe, preventable complications like pneumonia, virus-induced cancers, and debilitating shingles.^{5,8}

Healthcare workers face a unique risk in this environment. Junior doctors, specifically medical interns and postgraduates, work on the primary frontlines of high-volume tertiary care hospitals. Because of this, they face a double risk: they are highly exposed to catching vaccine-preventable diseases themselves, and they can accidentally transmit these pathogens to vulnerable, immunocompromised patients in the wards.¹⁰ Medical literature consistently shows that a strong, confident recommendation from a treating physician is the single biggest factor in getting patients to accept a vaccine and overcoming hesitancy.^{6,12}

Despite this pivotal role, there is a clear training gap during medical education. Undergraduate and postgraduate curricula focus heavily on paediatric national schedules but rarely teach adult or occupational vaccination guidelines. This curricular deficit leaves junior clinicians feeling unprepared to confidently counsel adult patients on vaccine choices, proper dosing schedules, or safety contraindications.¹² Furthermore, global and regional data point to a distinct knowledge-practice gap: while junior doctors generally have a very positive attitude toward vaccination, their personal vaccine uptake is often low due to busy schedules, high costs, and a lack of clear workplace guidelines.^{6,10}

While there is some data on vaccine hesitancy in the general public, very few contemporary studies focus on this vital transition period for interns and postgraduates in India, where lifelong clinical habits are actively formed. Understanding their baseline awareness is essential for creating better training programs and hospital safety policies. Therefore, this study was conducted to evaluate the knowledge, attitudes, and practices regarding adult vaccination among medical postgraduates and interns in a tertiary care teaching hospital, aiming to identify training gaps and improve future immunization practices.

METHODS

This cross-sectional questionnaire-based knowledge, attitude and practice (KAP) study was conducted among postgraduate students and interns working at K R Hospital, Mysuru. The study aimed to assess awareness, attitudes, and immunization practices related to adult vaccination among healthcare professionals in training. The study was conducted over a period of three months from August 2025 to October 2025, following approval from the Institutional Ethics Committee.

Participation in the study was voluntary, and only individuals who provided informed consent were included.

A purposive sampling technique was employed, whereby eligible postgraduates and interns available during the study period were invited to participate in the survey.

Questionnaire development

Data were collected using a predesigned, semi-structured questionnaire adapted from relevant literature and tailored to the local clinical context. To establish validity, the initial draft was reviewed by a panel of three senior faculty members; two from the Department of Pharmacology and one from the Department of Community Medicine. Modifications were made based on their expert feedback to ensure clinical relevance and clarity. The questionnaire was hence developed to assess knowledge, attitudes, practices, and factors influencing adult vaccination. The questionnaire consisted of a total of 22 items distributed across four domains.

Eight questions assessed the participant's knowledge regarding adult vaccination recommendations, indications, and vaccine-preventable diseases. For this knowledge domain, a formal scoring system was utilized where each correct response block was awarded one point, while incorrect or "unsure" responses received zero points, yielding a total possible knowledge score of 8. Participants achieving a score of 6 or more (representing a 70% or higher accuracy threshold) were categorized as having adequate knowledge.

Seven questions evaluated attitudes toward adult immunization using a 5-point Likert scale, including perceptions regarding vaccine effectiveness, safety, and importance. Five questions assessed personal vaccination practices and clinical immunization behaviors. The remaining two questions explored possible barriers and facilitators influencing vaccine uptake among participants using multiple-choice item selection. Overall performance across the attitude, practice, and barrier domains was evaluated using descriptive frequencies to identify specific clinical training deficits and behavioral trends.

The questionnaire consisted of closed-ended multiple-choice, multiple-response, and Likert-scale items to allow a structured and objective assessment of participants' responses. Questionnaire development was guided by the study objectives and relevant literature pertaining to adult vaccination and immunization practices among healthcare professionals. The structure of the questionnaire enabled separate analysis of knowledge, attitude, practice, and vaccination-related barriers.

Data collection procedure

The questionnaire was converted into an electronic survey using Google Forms. A participant information sheet and informed consent statement were included at the beginning of the survey. The consent section explained the purpose of the study, voluntary nature of participation, confidentiality of responses, and approximate time

required to complete the questionnaire. Participants were able to proceed to the survey only after providing their consent electronically.

The Google form link was distributed electronically to eligible postgraduate students and interns. Responses were collected anonymously during the study period and automatically recorded in a secure database. All completed responses were exported to Microsoft Excel for data management and analysis.

Data management and analysis

The collected responses were reviewed for completeness and consistency prior to analysis. Incomplete responses and duplicate submissions, if identified, were excluded from the final dataset. Data were entered and organized using Microsoft Excel. Descriptive statistical methods were employed for data analysis. Categorical variables were summarized using frequencies and percentages. The responses to individual knowledge, attitude, practice, and barrier-related questions were analysed separately and presented in the form of tables, charts, and graphs wherever appropriate. The study findings were primarily expressed as frequencies and percentages to provide an overview of participant's awareness, attitudes, and immunization practices regarding adult vaccination.

Ethical considerations

Ethical approval for the study was obtained from the Institutional Ethics Committee prior to commencement of data collection.

RESULTS

A total of 106 participants completed the survey. Among the participants, 56 (52.8%) were females and 50 (47.2%) were males. Mean age $\pm$ SD was 28 $\pm$ 4.3 years. Regarding professional status, the study included both postgraduates and interns from various departments of the tertiary care hospital. A little above half of the participants (51%) reported having received prior training or lectures regarding adult immunization, whereas 49% had not received any formal training.

Table 1: Demographic characteristics of the study participants (n=106).

Variables	Number (%)
Female	56 (52.8)
Male	50 (47.2)
Prior training on adult immunization	54 (51.0)
No prior training	52 (49.0)
Mean age (years)	28 $\pm$ 4.3

Knowledge regarding adult vaccination

A majority of the participants (71.7%) were aware that a separate immunization schedule exists for adults, while 28.3% were unaware.

When asked about vaccines recommended for adults, most participants identified commonly recommended vaccines such as hepatitis B, influenza, Tdap, COVID-19, pneumococcal vaccine, and HPV vaccine. Awareness regarding herpes zoster and MMR vaccines was comparatively lower.

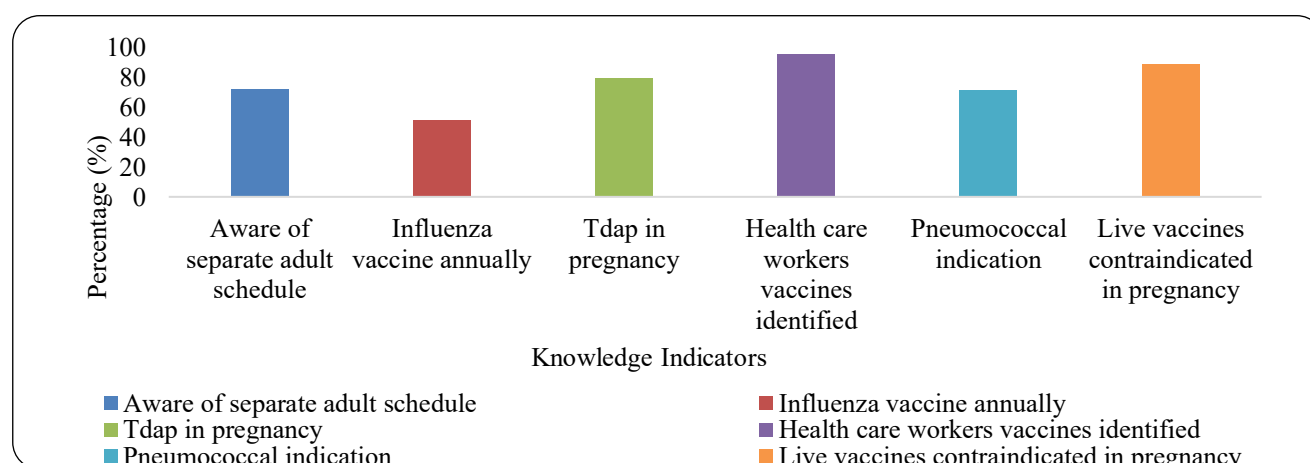


Figure 1: Knowledge amongst the participants about adult vaccination.

Regarding influenza vaccination schedules, 53% correctly identified that influenza vaccine should be administered annually. However, 31.4% believed it should be administered once every five years, while 7.8% believed it is administered once in a lifetime and another 7.8% were unsure.

Knowledge regarding vaccination during pregnancy was satisfactory, with 84.3% correctly identifying Tdap as the recommended vaccine during pregnancy.

Most participants (94.3%), correctly identified vaccines recommended for healthcare workers, particularly hepatitis B and COVID-19 vaccines. Awareness regarding

influenza and Tdap vaccination for healthcare workers was comparatively lower.

Knowledge regarding pneumococcal vaccination was adequate, with 74.5% recognizing that pneumococcal vaccine is recommended for adults with chronic illnesses such as Chronic heart disease, chronic lung disease (including COPD and asthma), diabetes, chronic liver disease, or cirrhosis.

The majority of participants (94.1%) correctly identified that live vaccines such as MMR and varicella are

contraindicated during pregnancy. Regarding travel-related vaccination, many participants identified vaccines such as yellow fever, typhoid, hepatitis A, and COVID-19 as vaccines recommended before international travel, although awareness varied among respondents.

Attitude toward adult vaccination

A highly positive attitude toward adult immunization was observed among the participants. About 66.7% strongly agreed and 29.4% agreed that adult vaccination is important in preventing vaccine-preventable diseases.

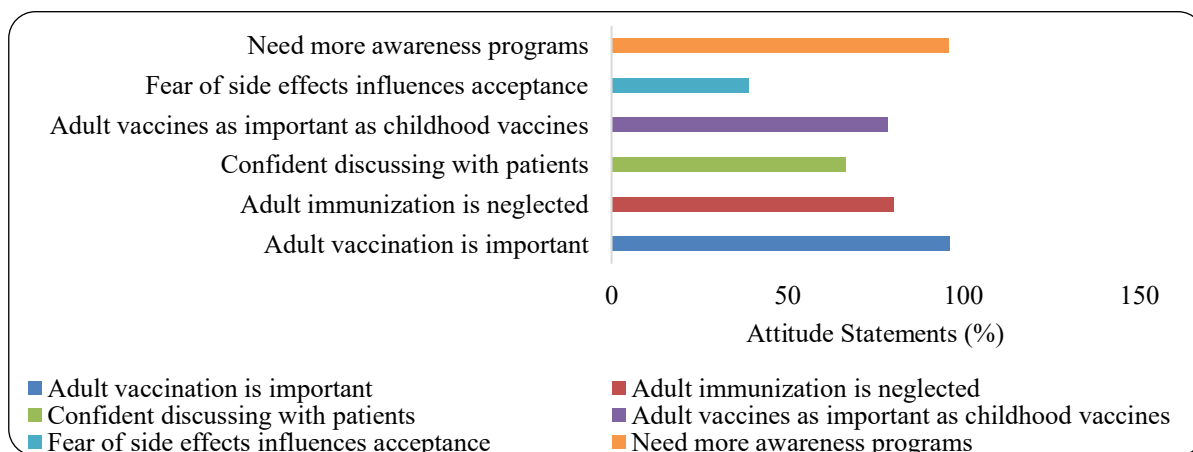


Figure 2: Attitude amongst the participants towards adult vaccination.

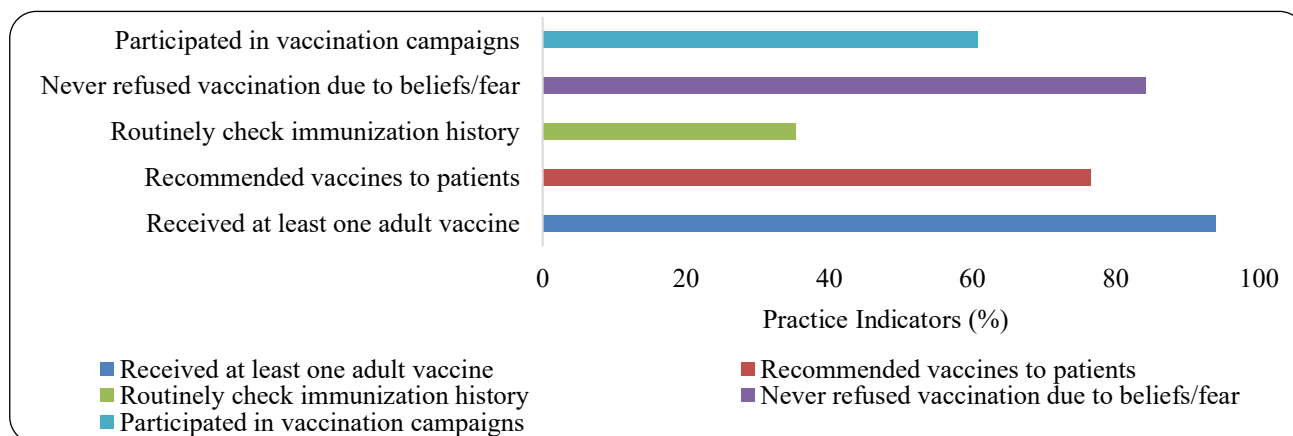


Figure 3: Practice pattern of adult vaccination amongst the participants.

Regarding the current healthcare system, 49% agreed and 31.4% strongly agreed that adult immunization is neglected in routine healthcare practice.

Confidence in discussing adult vaccination with patients was moderate, with 52.9% agreeing and 13.7% strongly agreeing that they felt confident discussing adult immunization with patients.

When asked whether adult vaccines are necessary only for elderly or high-risk individuals, responses varied,

indicating persistence of certain misconceptions regarding adult immunization.

Most participants considered adult vaccines to be as important as childhood vaccines, with 47.1% agreeing and 31.4% strongly agreeing with the statement.

Fear of side effects contributing to vaccine hesitancy was reported by a proportion of participants, with 39.2% agreeing that fear of adverse effects may influence vaccine acceptance, whereas 27.5% disagreed with the statement.

A large majority supported the need for awareness initiatives, with 52.9% strongly agreeing and 43.1% agreeing that more awareness programs are necessary to improve adult immunization practices.

Practice regarding adult vaccination

Most participants (94%) reported having received at least one adult vaccine themselves. Among the vaccinated participants, commonly received vaccines included COVID-19 vaccine, hepatitis B vaccine, tetanus-containing vaccines, and influenza vaccine.

Regarding recommendation practices, 76.5% stated that they had recommended adult vaccines to patients during clinical practice. However, only 35.3% routinely checked the immunization history of adult patients, while 60.8% reported that they did not routinely assess vaccination history.

The majority of participants (84.3%) reported that they had never refused or avoided vaccination because of personal beliefs or fear of side effects.

Participation in adult vaccination campaigns such as COVID-19, hepatitis B, or influenza vaccination drives was reported by 60.8% of participants.

Barriers to adult vaccination

The most commonly perceived barriers to adult immunization included lack of awareness, high cost of vaccines, time constraints, fear of side effects, limited vaccine availability, and lack of institutional guidelines. The lack of awareness and inadequate institutional emphasis emerged as major barriers identified by participants.

Facilitators to improve adult vaccination

Participants identified several measures that could improve adult vaccination rates, including: Increased training and awareness programs for healthcare workers, Free or subsidized vaccination programs, Dedicated adult vaccination clinics, Inclusion of adult vaccination in routine health checkups, And stronger national guidelines regarding adult immunization.

Most (76.4%) participants emphasized the importance of educational interventions and institutional support in improving adult vaccine uptake.

DISCUSSION

The present study assessed the knowledge, attitudes, and practices regarding adult vaccination among postgraduate students and interns working in a tertiary care hospital. Overall, the findings demonstrated satisfactory knowledge and a positive attitude toward adult immunization. Most participants were aware of the existence of adult

immunization schedules, recognized the importance of adult vaccination, and reported receiving at least one adult vaccine. However, gaps were identified in routine vaccination assessment and integration of adult immunization into regular clinical practice, highlighting a disparity between knowledge and implementation.

In the present study, 71.7% of participants were aware that a separate immunization schedule exists for adults. This finding is comparable to that reported by Kashyap et al., in which approximately 72.4% of postgraduate resident doctors were aware of adult immunization schedules.⁹ Similarly, 84.3% of participants in our study correctly identified Tdap as the recommended vaccine during pregnancy, while 94.3% recognized vaccines recommended for healthcare workers. These findings indicate a generally satisfactory level of awareness regarding important aspects of adult vaccination among healthcare professionals in training. Compared with Siddiqui et al., who reported awareness of adult immunization schedules in only 49.07% of healthcare workers, participants in the present study demonstrated relatively better knowledge regarding adult vaccination recommendations.¹⁰ This difference may be attributable to greater exposure to vaccination-related information during postgraduate and internship training.

Knowledge regarding specific vaccine indications was also encouraging. Approximately 74.5% of participants correctly identified pneumococcal vaccination for adults with chronic illnesses, and 94.1% recognized that live vaccines such as MMR and varicella are contraindicated during pregnancy. Similar observations were reported by Kashyap et al, who found good awareness regarding vaccination during pregnancy and healthcare worker vaccination recommendations.⁹ Our findings are also consistent with those of Jain et al, who reported that Hepatitis B was the best-known adult vaccine among resident doctors, whereas knowledge regarding MMR and zoster vaccines was comparatively lower.¹¹ Likewise, participants in the present study demonstrated better awareness of commonly recommended vaccines such as hepatitis B, influenza, COVID-19, and Tdap, while awareness regarding herpes zoster and MMR vaccines remained relatively limited. These findings suggest that familiarity with vaccines commonly encountered during clinical practice may influence knowledge levels among healthcare professionals.

Participants in the present study exhibited a highly positive attitude toward adult immunization. A total of 96.1% either agreed or strongly agreed that adult vaccination is important in preventing vaccine-preventable diseases, and 96% supported the need for additional awareness programs. Furthermore, 80.4% believed that adult immunization remains neglected in routine healthcare practice. These findings are consistent with those of Kashyap et al, where all respondents agreed that adult immunization is essential despite being a neglected component of healthcare delivery.⁹ Similarly, Siddiqui et

al. reported that 75.93% of healthcare workers considered adult immunization to be very important.¹⁰ Collectively, these findings suggest increasing recognition among healthcare professionals regarding the role of adult vaccination in disease prevention and health promotion.

Despite favorable knowledge and attitudes, certain deficiencies were observed in vaccination practices. Although 94% of participants reported receiving at least one adult vaccine and 76.5% had recommended adult vaccines to patients, only 35.3% routinely assessed the immunization history of adult patients. This finding highlights a knowledge practice gap, wherein awareness does not consistently translate into routine clinical behavior. Similar discrepancies have been reported by Patel et al., who observed that many physicians did not routinely communicate with adult patients regarding vaccination despite acknowledging its importance.¹² Such findings indicate that barriers beyond knowledge, including time constraints, competing clinical priorities, and lack of institutional support, may influence vaccination-related practices.

The most commonly perceived barriers identified in the present study included lack of awareness, high vaccine cost, fear of side effects, limited vaccine availability, time constraints, and absence of clear institutional guidelines. Similar barriers have been reported by Siddiqui et al and Patel et al, who identified cost and lack of awareness as major obstacles to adult vaccine uptake.^{10,12} In addition, concerns regarding vaccine safety and misconceptions about vaccination have been reported among healthcare workers in other studies, including that of Riccò et al.¹³ These findings emphasize the need for targeted educational interventions and stronger institutional support to improve adult vaccination coverage.

Participants suggested several measures that could improve adult immunization rates, including regular training programs, free or subsidized vaccination services, dedicated adult vaccination clinics, incorporation of vaccination into routine health checkups, and stronger national guidelines. Similar recommendations have been proposed by Patel et al and other investigators, highlighting the importance of policy-level initiatives alongside educational interventions.¹² Establishing structured adult vaccination services within healthcare institutions may facilitate routine assessment and improve vaccine uptake among both healthcare workers and the general population.

The present study has certain limitations. It was conducted at a single tertiary care hospital and involved a relatively limited sample size, which may restrict the generalizability of the findings. In addition, the use of a self-administered questionnaire may have introduced recall bias and social desirability bias. Nevertheless, the study provides valuable insights into the knowledge, attitudes, and practices regarding adult vaccination among postgraduate students

and interns and highlights important areas for future educational and institutional interventions.

CONCLUSION

The present study demonstrated generally good knowledge and a positive attitude toward adult vaccination among postgraduate students and interns. However, gaps remain in routine vaccination assessment, vaccine recommendation practices, and awareness of certain adult vaccines. Strengthening educational programs, incorporating adult vaccination into routine clinical training, and developing clear institutional policies may help improve adult immunization practices among future healthcare professionals.

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