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Knowledge, attitude, and practice of medical students regarding immunization and National Maternal and Child Health program in India

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ABSTRACT

Background: There are gaps in knowledge, attitude, and practice (KAP) regarding immunization and National Maternal and Child Health program among health care workers. **Aims and Objectives:** This study aims to study the KAP gaps related with immunization among medical students at a teaching institute. **Materials and Methods:** A total of 321 medical students were evaluated using a 54-item pre-validated inventory containing 36 items on knowledge, 8 on attitude, and 10 on practice with total possible scores of 55, 8, and 17, respectively. Details regarding type of student (undergraduates, intern, and postgraduates), sex, age, and marital status were noted. For illustrative purposes, the domain scores were transformed to percentages. Data were analyzed using SPSS 21.0 Software. Kruskal–Wallis, Mann–Whitney U tests, and Pearson correlation coefficient were employed for statistical analysis. **Results:** Maximum were final year MBBS (n = 146) followed by interns (n = 106) and 1st year postgraduate students (n = 69). Majority were female (55.8%), aged 22–25 years (74.8%), and unmarried (91.9%). Mean percentage scores for knowledge and attitude were 51.44 ± 13.35% and 65.54 ± 31.05%. For immunization subdomain of knowledge, attitude, and practice, these were 58.45 ± 16.15%, 72.20 ± 32.59%, and 36.74 ± 13.10%, respectively. Knowledge and practice scores showed a significant association with type of student. Attitude scores did not show a significant association with demographic profile of student. Maximum scores for all the domains were observed among postgraduates. Overall practice scores were much lower than knowledge and attitude. A significant correlation was observed between knowledge, attitude, and practice scores. **Conclusion:** The study identifies wide gaps in KAP of medical students that indicate need for strategic interventions.

Key words: Health programs; Immunization; Knowledge; Attitude; Practices; Medical students

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INTRODUCTION

Adequate, acceptable, and quality health-care services, easily accessible by the community, are important to achieve universal health coverage envisaged as fundamental goals of the World Health Organization. Universal health coverage is all inclusive of essential health services, from health promotion to preventive, curative, rehabilitative, and palliative care.[1] Government of India has launched a number of national health programs to control the communicable diseases and to raise the standard of nutrition and to improve maternal and child health.[2] National immunization program forms an indispensable measure to combat vaccine preventable diseases in children under 5 years and is an essential part of Maternal and Child Health program in India.[3]

Despite considerable progress in the past few years on immunization coverage, the average utilization remains far less than above 90% utilization by 1 year of age, as

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envisaged under National Health Policy. NFHS-4 data show that only 62% of children aged 12–23 months received at least BCG, measles, and three doses each of polio and DPT for the year 2015–2016 in India.[4] Only 21% of pregnant women received full antenatal care and only 30% of women consumed iron folic acid for 100 days or more during pregnancy. Financial assistance under Janani Suraksha Yojana (JSY) for institutional delivery could be utilized by only 36.4% of women.[4] These wide gaps in utilization of immunization and mother and child health services indicate the need for motivation and mobilization of targeted beneficiary. Health-care professionals (HCPs) could play a crucial role in this direction.[5] It has been shown that physician's attitude toward vaccines can directly impact patient's decision to accept or reject immunization.[6,7] In addition to administering vaccinations, HCPs also play a crucial role in providing education and advocacy to the public regarding immunization. Yet, many current and future health-care personnel are unprepared or reluctant to address the vaccine conversation with the hesitant patients.[8]

A medical student is a budding physician in making. Adequate knowledge regarding immunization and Maternal and Child Health programs coupled with a positive attitude and appropriate practices could help in giving a substantial boost to the national immunization and Maternal and Child Health programs. However, studies from different parts of world have shown that there are substantial gaps in this context among HCPs.[8,9] Hence, the present study was proposed to find out knowledge, attitude, and practice (KAP) of the medical students regarding immunization considering as primary objective and Maternal and Child Health program as secondary objective at a teaching hospital in North India.

Aims and objectives

To study the KAP gaps related with immunization among medical students at a teaching institute. The present study was proposed to find out knowledge, attitude, and practice (KAP) of the medical students regarding immunization considering as primary objective and Maternal and Child Health program as secondary objective at a teaching hospital in North India.

MATERIALS AND METHODS

This cross-sectional study was conducted at a teaching hospital in India from February 2020 to April 2020 after seeking approval from the Institutional Ethics Committee and obtaining informed consent from the participants. A total of 321 medical students were enrolled in the study. The sample size projections were based on a study by Berera and Thompson who reported the percentage knowledge score to be 55%.[8] We also targeted a similar outcome. Sample size was calculated taking 95% significance, 10% allowable relative error (10% of 55%) to get 90% power which was calculated to be 315 in the study population using the formula:

$$n = z_{\alpha}^{2} pq$$

Data collection

Demographic details (type of student – undergraduates [UGs]/intern/postgraduates [PGs], gender, age, and marital status) were noted. A self-administered and pre-validated questionnaire was developed by the research team having three parts: (a) Knowledge-related questions on Maternal and Child Health program and immunization (36 items including both binary and multiple options, totaling to a maximum of 55 possible correct responses), (b) attitude (8 items based on a 3-point Likert scale (negative, neutral, and positive); and (c) practices (17 items having one possible correct response).

Development of the inventory

The tool was developed through a brainstorming session of an expert panel comprising the investigator, senior faculty members, and faculty from community medicine department. During the session, exhaustive questions related with KAP were raised and noted down. Subsequently, a rough draft of the questionnaire was prepared and was given to each member individually with the instruction to strike out the repetitive questions or to include any missing question. A meeting of the expert panel was scheduled after the first meeting where each member presented his/her edited version of the questionnaire. The inclusion or exclusion of each item was discussed thoroughly by the expert panel. Subsequently, a 54-item inventory was approved by the panel that included 36 items on knowledge, 8 items on attitude, and 10 items on practice. The questions on attitude were scored on a 3-point Likert scale for which the negative response was marked as −1, neutral response was marked as 0, and positive response was marked as +1. In knowledge section, 36 items included one or more correct response, for each correct response, a score of 1 was awarded whereas incorrect response scored 0. In total, these 36 items had a maximum of 55 correct responses. Similarly, in practice section, there were one or more correct responses for each of the 10 items; each correct response scored 1. The practice session thus could have 17 correct responses.

A pilot study was carried out first on 30 medical students who were not a part of the study to check for the comprehensibility of the tool. Following pilot study, rephrasing of 8 the items was done to rule out any

dubiousness in the questions. The rephrased inventory was then adopted for final data collection.

Composition of the inventory

Knowledge questions covered major national health programs such as National Immunization Schedule (NIS), Reproductive Maternal Newborn Child and Adolescent Health (RMNCH+A), Janani Suraksha Yojna (JSY), Integrated Management of Newborn and Childhood Illness (IMNCI), Rashtriya Bal Swasthya Karyakram (RBSK), Mission Indradhanush, Mother's absolute affection (MAA), and nutritional programs. Knowledge questions related to immunization incorporated the vaccines covered under NIS, storage and transport of vaccines, adverse reactions, open vial policy, and missed opportunities of vaccination. The immunization subsection of the knowledge section had a maximum possible score of 18.

The second part of the inventory was related to the attitude toward national programs and immunization. The last part of the inventory encompassed questions on practice of the immunization like maintenance of cold chain before administration of the vaccine, vaccine vial monitor (VVM), and other important practical aspects.

Data collection

After the final draft of the expert-validated tool was made, the process of data collection was started among the medical students. Data were collected over a period of 3 months.

Data analysis

Data thus collected were fed into computer. Percentage transformation of total section scores and subsection scores was done in Microsoft Excel software. Statistical analysis was done using Statistical Package for the Social Sciences version 21. Chi-square test was used for qualitative assessment. For KAP scores, non-parametric evaluation plan was adopted using Kruskal–Wallis and Mann–Whitney U tests. Bivariate correlation was done using Pearson correlation coefficient.

RESULTS

A total of 321 medical students were enrolled in the study. Out of these, maximum students (n=146; 45.5%) were final year UGs followed by interns (n=106; 33.0%) and final year PGs (n=69; 21.5%), respectively. Majority of the students were girl (55.8%). Proportion of females was significantly higher among UGs (63%) and interns (54.7%) as compared to that in PGs (42%) (P=0.015). Age of respondents ranged from 22 to 28 years. Majority (74.8%) were aged 22–25 years. A significant shift in proportion of those aged 26–28 years was seen from UGs (3.4%) to PGs (88.4%) (P<0.001). Most of the students (91.9%) were unmarried. Proportion of married students was 5.5%, 1.9%, and 23.2%, respectively in UGs, interns, and PGs, respectively, thus showing a significant difference (P<0.001) (Table 1).

Overall mean knowledge, attitude, and practice scores were 28.29±7.34, 5.24±2.48, and 6.25±2.23, respectively. On percentage transformation, these scores were 51.44±13.35, 65.54±31.05, and 36.74±13.10% (Figure 1a and b).

For immunization subsection of domains knowledge, attitude, and practice, the mean scores were 10.52±2.56, 2.89±1.30, and 6.25±2.23, respectively. On percentage transformation, these scores were 58.45±16.15%, 72.20±32.59%, and 36.74±13.10%, respectively (Figure 1b).

Mean knowledge, attitude, and practice total scores as well as immunization scores were found to be maximum in postgraduates. Mean knowledge scores (total) and immunization subsection were minimum in interns while mean attitude scores (total) and immunization subsection

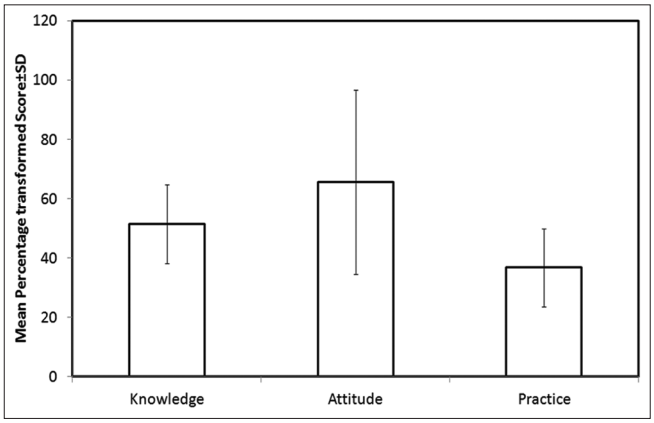

Figure 1a: Percentage knowledge, attitude and practice scores in study population – Percentage scores in study population

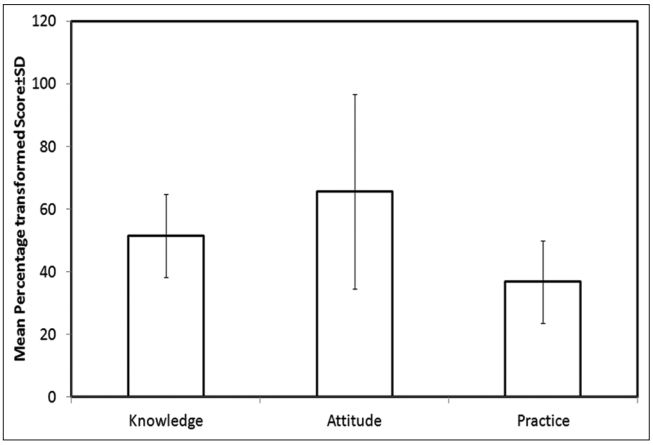

Figure 1b: Percentage transformed scores for immunization subsection of knowledge, attitude, practice – Percentage scores in study population

and practice scores were minimum among undergraduates. Statistically, a significant difference among different types of respondents was observed for knowledge scores (total and immunization subsection) and practice domains (P<0.001). Girls had higher scores for all the knowledge and attitude domains and their subsections whereas boys had higher scores for practice domain. A significant difference between two genders was observed only for attitude scores which were significantly higher in females as compared to that in males (P=0.010). For all the three domains and their subsections, the mean scores were higher among those aged 26–28 years as compared to those aged 22–25 years, the difference was statistically significant only for practice domain (P=0.018). For knowledge and attitude domain and their subsections, the mean scores were higher among unmarried as compared to married students, on the other hand, for practice domain, the mean scores were higher among married as compared to unmarried students. There was no significant difference in KAP scores for any of the domains or their subsections between unmarried and married students (P>0.05) (Table 2 and Figure 2).

Total knowledge score showed a strong positive correlation with the immunization knowledge scores (r=0.717; P<0.001). A statistically significant yet weak positive correlation of knowledge (total) scores was observed with attitude (total) and attitude (immunization scores) (r=0.183 and r=0.204; P<0.01 and P<0.001) and a mild positive correlation with practice scores (r=0.366; P<0.001). Knowledge (immunization subsection) scores showed a weak positive and significant correlation with attitude (total) (r=0.201; P<0.001) and attitude (immunization) (r=0.183; P<0.01); and a mild positive correlation with practice scores (r=0.339; P<0.001). A strong correlation of attitude (total) scores was seen with attitude (immunization) scores (r=0.801; P<0.001), however, it showed a weak positive correlation with practice scores (r=0.274). Attitude (immunization) scores showed a weak positive

Table 1: General profile and characteristics of study population (n=321)

S. No.	Characteristic	Total (n=321)		Final year MBBS (n=146)		Intern (n=106)		Final year postgraduate students (n=69)		Statistical significance
		n	%	n	%	n	%	n	%	
1.	Sex									
	Male	142	44.2	54	37.0	48	45.3	40	58.0	χ^2=8.45; P=0.015
	Female	179	55.8	92	63.0	58	54.7	29	42.0	
2.	Age									
	22–25 years	240	74.8	141	96.6	91	85.8	8	11.6	χ^2=190.0; P<0.001
	26–28 years	81	25.2	5	3.4	15	14.2	61	88.4	
3.	Marital Status									
	Married	26	8.1	8	5.5	2	1.9	16	23.2	χ^2=27.9; P<0.001
	Unmarried	295	91.9	138	94.5	104	98.1	53	76.8	

Table 2: Association of knowledge, attitude, and practice scores with demographic characteristics of respondents

S. No.	Characteristic	Knowledge (total)		Knowledge (immunization)		Attitude (total)		Attitude (immunization)		Practice	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
1.	Type										
	MBBS Final year student (n=146)	28.79	7.28	10.81	2.56	5.12	2.40	2.85	1.31	5.72	2.14
	Intern (n=106)	26.53	5.91	9.49	2.17	5.19	2.55	2.90	1.26	6.58	2.18
	Final Year PG student (n=69)	29.94	8.87	11.49	3.97	5.59	2.56	2.96	1.37	6.84	2.27
	"P" (Kruskal–Wallis test)	0.015		<0.001		0.201		0.656		<0.001	
2.	Sex										
	Male (n=142)	27.19	7.67	10.28	3.27	5.18	2.54	2.84	1.39	6.38	2.49
	Female (n=179)	29.16	6.97	10.71	2.58	5.30	2.44	2.93	1.24	6.14	1.99
	"p" (Mann–Whitney U-test)	0.010		0.068		0.748		0.813		0.375	
3.	Age										
	22–25 years (n=240)	28.22	6.73	10.38	2.42	5.20	2.37	2.87	1.28	6.08	2.15
	26–28 years (n=81)	28.49	8.97	10.93	4.01	5.38	2.80	2.94	1.38	6.75	2.39
	"P" (Mann–Whitney U-test)	0.854		0.298		0.178		0.386		0.018	
4.	Marital status										
	Married (n=26)	27.12	8.80	10.12	3.82	5.00	2.43	2.77	1.48	6.77	2.60
	Unmarried (n=295)	28.39	7.21	10.56	2.82	5.26	2.49	2.90	1.29	6.20	2.19
	"P" (Mann–Whitney U-test)	0.259		0.441		0.449		0.892		0.212	

and statistically significant correlation with practice scores (r=0.233; P<0.001) (Table 3).

DISCUSSION

The present study revealed wide gaps in knowledge and practices of medical students in relation to immunization and maternal and child health programs. In our study, both the knowledge and practices were seen to be different in the three respondent groups with PG students scoring better than the UGs and interns. Student's age, gender, and marital status were not associated with the KAP score. The practice domain showed the widest gaps (% score 36.74) while attitude gaps were narrowest (% score 65.54). While a mild positive relationship between practice and knowledge domains was observed, the attitude domains were only weakly correlated either with knowledge or with practice. These findings suggest an independence of knowledge and practice from attitude and imply that despite having a good attitude, only augmentation of knowledge would not help in improvising the practice. Wide gaps in KAP on community health programs among HCPs as observed in are not an isolated issue as observed in present study. Upadhyay et al.,[10] in their study in Nepal on knowledge of national free health services among health care workers including medical students, found uniformly poor percentage score with majority of students not knowing the names of free health programs, diseases for which nationwide free treatment are given and activities under nutrition program. While in our study, the respondents knew about major Maternal and Child Health program such as JSY, RMNCH+A, RBSK, IMNCI, Mission Indradhanush, National Iron plus initiative, and NIS but had limited knowledge on India Newborn action plan, NavjaatShishu Suraksha Karyakram, and Reverse cold chain. A systematic review showed limited knowledge of health care workers including medical students and nursing staff on breastfeeding. Timing of

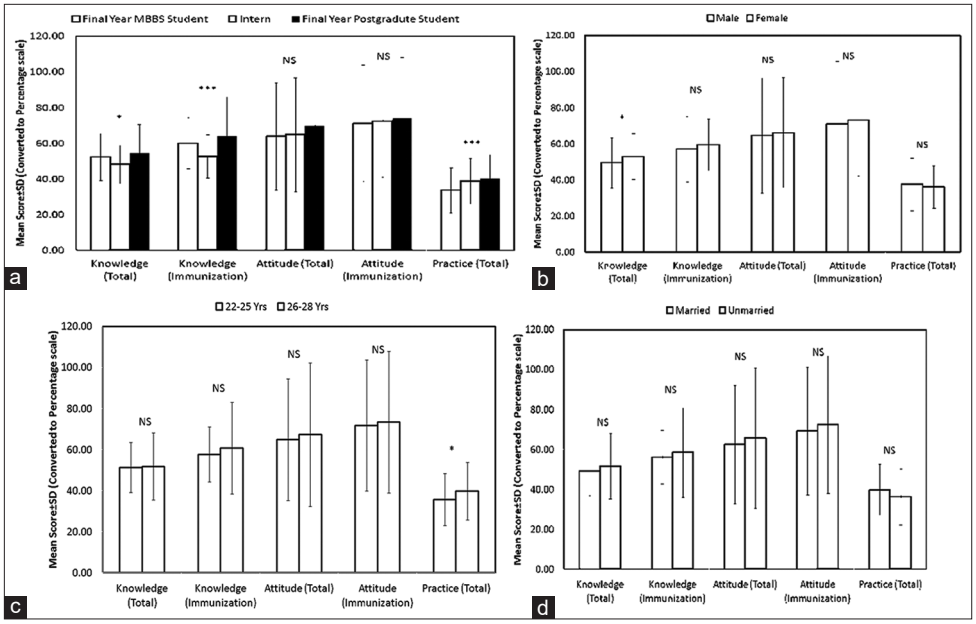

Figure 2: Association of knowledge, attitude, and practice scores (percentage transformed) with (a) type; (b) sex; (c) age; and (d) marital status of respondents. **(a)** Intergroup differences have been depicted in terms of markings: NS: Not Significant; *P<0.05; **P<0.01; ***P<0.001 (Kruskal-Wallis test). **(b)** Intergroup differences have been depicted in terms of markings: NS: Not Significant; *P<0.05; **P<0.01; ***P<0.001 (Mann-Whitney U test). **(c)** Intergroup differences have been depicted in terms of markings: NS: Not Significant; *P<0.05; **P<0.01; ***P<0.001 (Mann-Whitney U test). **(d)** Intergroup differences have been depicted in terms of markings: NS: Not significant; *P<0.05; **P<0.01; ***P<0.001 (Mann-Whitney U test)

Table 3: Correlation between knowledge, attitude, and practice scores (Pearson correlation coefficient "r")

Variable	Variable				
	Knowledge (total)	Knowledge (immunization)	Attitude (total)	Attitude (immunization)	Practice
Knowledge (total)	1	0.779***	0.183**	0.204***	0.366***
Knowledge (immunization)		1	0.201***	0.183**	0.339***
Attitude (total)			1	0.801***	0.274***
Attitude (immunization)				1	0.233***
Practice (total)					1

*P<0.05; **P<0.01; ***P<0.001

maternal and child health curriculum, gender, and cultural practices also affected their attitude.[11] Whereas in our study, majority of participants were aware of MAA program and national programs promoting breastfeeding.

The significance of modification in educational program and syllabus of the health professionals to fill the possible gaps in their knowledge and perturbing attitudes and behaviors regarding immunization has also been highlighted in Vaxed Survey too.[12]

Compared to the present study, where knowledge, attitude, and practice scores did not show a linear progression with increasing years of medical education, Berera and Thompson[8] in their study showed a linear incremental trend in knowledge scores with increasing years of medical education. In a systematic review by Herzog et al.,[13] it was found that health care workers with higher knowledge, positive attitude, awareness, and beliefs aligned with scientific evidence were more inclined to vaccinate. Interestingly, in our study, knowledge scores of UGs were higher than that of interns, however, on attitude and practice part, they lagged behind. Thus, the scenario showed that only enhancement of knowledge might not help in accumulating a better attitude and practice among medical professionals. In fact, either the experience acquired during medical practice and direct interaction with patient helps to affect the attitude and practice part better than just augmenting the knowledge. This implies that a better interaction with patients and community could help in inculcating a better attitude and practice. Nevertheless, the immense gap between practice and attitude scores (36.74% vs. 65.54%) indicated that there are certain barriers that restrict the transformation of these attitudes into actual practice. It is hence essential to identify these barriers and to prepare appropriate strategies to remove these barriers, providing them more exposure, motivation, and reinforcement to obtain better practice outcomes.

In the present study, most of them had very good knowledge regarding VVM working and when not to use a vaccine. Nearly half had the experience of vaccinating a child on their own. Majority of respondents answered that they would check VVM, expiry date, seal of the vaccine, and turbidity before delivering it to a child. However, their practice on where to keep a diluent in a refrigerator, not with-holding vaccination to a child with minor ailment, information they provide a mother while giving BCG vaccine was poor.

Vaccine hesitancy and disinformation are an attribute exhibited not only by parents but also in health care workers due to information from non-trustworthy sources.[14-16] Vaccine-hesitant health care workers are likely to recommend vaccines with less assurance and certainty to their patients. Certain barriers in this respect include socioeconomic status, level of education, cost of vaccines, social beliefs, and misinformation contributing to anxiety and refusal to vaccine in parents.[17] In the present study, we had limited information regarding the demographic profile of the respondents. Moreover, the actual transformation into practice depends on the characteristics of the environment they work in too. In the present study, we had respondents from only one working environment and hence we are not in a position to comment on that issue. Nevertheless, parents receiving information from care providers having positive attitude and inclination to vaccinate rather than guided by only risks of vaccine are more likely to vaccinate their children and share same beliefs as their care providers.[18,19] Besides, children immunization is also an essential part of women's health care. Immunizing pregnant women with two doses of tetanus toxoid and diphtheria is a part of NIS in India. Study in Michigan on obstetrician's role in immunization ranked not considering vaccination as a part of regular patient care activities as the most frequent response for not administering routine vaccination against vaccine preventable diseases.[20] Fortunately, in our study, such negative attitudes were not much prevalent. In fact, it was the attitude which ranked highest amongst knowledge, attitude, and practice domains. However, in some studies, negative attitudes and poor knowledge played considerably important role in poor performance of vaccination programs.[21] In context with measles rubella (MR) vaccination, despite a poor knowledge of students regarding MR campaign, open vial policy, and missed opportunity of vaccination, more than one-third of students thought that autism is a side effect to vaccines. Despite several evidence-based studies against a causal association, many health care workers continue to believe that vaccines particularly MMR can cause autism.[22,23] These findings show that upheld beliefs, even on non-scientific reports, are considered to be a barrier toward practical transformation of knowledge and attitudes into good practices.

In the present study, some of the issues recognized regarding transformation of good practice were lack of knowledge about the management of anaphylaxis, inability to communicate with the patients, and poor practical skill. As stated earlier with adequate exposure, motivation and reinforcement these issues could be tackled effectively to provide an impetus to immunization and national Maternal and Child Health program of the country.

This study provides a basis to emphasize on the need to enrich the medical education on national health programs with a goal to give them an insight into its significance and applicability keeping in view the current health scenario in

India. The difference in the KAP scores among different category of medical students in this study indicates to incorporate knowledge and attitude with adequate exposure to be transformed into a good practice. This study highlights the pressing need to advocate competency-based medical education which is essential to hone the skills needed for vaccination to achieve better achievement of goals envisaged by immunization and national maternal and child health program in India.[24]

Limitation of the study

As the study was conducted at a single medical college, hence the results cannot be generalized. Further studies are needed to measure the knowledge, attitude, and practice gaps among medical students with regard to national health programs in India.

CONCLUSION

The study identifies wide gaps in KAP of medical students with regards to immunization and health programs and highlights the need for strategic interventions to improve this status.

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