

ПЕДИАТРИЯ PEDIATRICS

ATTITUDE AND AWARENESS OF INDIAN PARENTS FROM KERALA STATE TOWARDS CHILDREN'S VACCINATION AT THE COVID-19 PANDEMIC BACKGROUND

Aaromal Ajitha Sureshkumar ¹,
Novikova E.A. ²,
Abhiramy Suprasannan ²,
Manu Krishna Maniyan Girija ³,
Vanyarkina A.S. ²,
Moskaleva E.V. ²,
Kazantseva E.D. ²,
Petrova A.G. ²,
Rychkova L.V. ²

¹ Irkutsk State Medical University
(Krasnogo Vosstaniya str. 1, Irkutsk 664003,
Russian Federation)

² Scientific Centre for Family Health
and Human Reproduction Problems
(Timiryazeva str. 16, Irkutsk 664003,
Russian Federation)

³ University of Barcelona
(Gran Via de les Corts Catalanes 585,
Barcelona, Spain)

Corresponding author:
Evgenia A. Novikova,
e-mail: europe411@mail.ru

ABSTRACT

Background. Vaccination coverage of children in India is not sufficient since the COVID-19 pandemic (less than 90%). This may lead to low adherence of parents to children's vaccination.

The aim. To study parental attitudes and awareness towards children vaccination programs in India at the COVID-19 pandemic background.

Methods. Two hundred and fourteen participants from Kerala state (India) took part in the descriptive cross-sectional study via survey method. The survey was prepared with Google form according the principles of anonymity.

Results. Indian parents demonstrated good adherence towards children's vaccination, 98.6 % (95% confidence interval (CI): 95.9–99.5) of them vaccinated their child, and if vaccination appointment had to be rescheduled 84.6 % (95% CI: 79.1–88.8) of them vaccinated children after. Most of Indians (68.7 %; 95% CI: 62.1–74.5) preferred to vaccinate children in state clinics, however, 28.5 % (95% CI: 22.8–34.8) chose private clinics. Information about diseases that vaccines can prevent, vaccine safety, and side effects 47.2 % (95% CI: 40.6–53.8) of parents got from public pediatricians, 50.9 % (95% CI: 44.2–57.5) – from private pediatricians, and 10.3 % (95% CI: 6.8–15.0) – from complementary and alternative medicine practitioners. Over 80 % of Indians were informed about vaccination through mass media (83.6%; 95% CI: 78.1–87.9). Indian parents showed low awareness about vaccination, because 63.1 % (95% CI: 56.4–69.2) of parents wanted to know more about vaccination. Moreover, before vaccination 21.5 % (95% CI: 16.5–27.4) of them were not informed by a doctor about health benefits and possible risks for their children.

Conclusion. In the COVID-19 pandemic Indian parents showed good attitude towards vaccination and low awareness in vaccination questions.

Key words: vaccination, vaccine prevention, children, parents, vaccine attitude, vaccine awareness, COVID-19

For citation: Aaromal Ajitha Sureshkumar, Novikova E.A., Abhiramy Suprasannan, Manu Krishna Maniyan Girija, Vanyarkina A.S., Moskaleva E.V., Kazantseva E.D., Petrova A.G., Rychkova L.V. Attitude and awareness of Indian parents from Kerala state towards children's vaccination at the COVID-19 pandemic background. *Acta biomedica scientifica*. 2023; 8(6): 178-185. doi: 10.29413/ABS.2023-8.6.17

Received: 05.09.2023
Accepted: 01.12.2023
Published: 29.12.2023

ОТНОШЕНИЕ И ОСВЕДОМЛЁННОСТЬ ИНДИЙСКИХ РОДИТЕЛЕЙ ИЗ ШТАТА КЕРАЛА О ВАКЦИНАЦИИ ДЕТЕЙ В УСЛОВИЯХ ПАНДЕМИИ COVID-19

Ааромал Сурешкумар¹,
Новикова Е.А.²,
Абхирами Супрасаннан²,
Ману Кришна³,
Ваняркина А.С.²,
Москалева Е.В.²,
Казанцева Е.Д.²,
Петрова А.Г.²,
Рычкова Л.В.²

¹ ФГБОУ ВО «Иркутский государственный медицинский университет» (664003, г. Иркутск, ул. Красного Восстания, 1, Россия)

² ФГБНУ «Научный центр проблем здоровья семьи и репродукции человека» (664003, Иркутск, ул. Тимирязева, 16, Россия)

³ Университет Барселоны (г. Барселона, ул. Gran Via de les Corts Catalanes, 585, Испания)

Автор, ответственный за переписку:
Новикова Евгения Анатольевна,
e-mail: europe411@mail.ru

РЕЗЮМЕ

Введение. С начала пандемии COVID-19 в Индии наблюдается снижение охвата вакцинацией детей (менее 90 %), что может привести к снижению приверженности родителей вакцинации.

Цель. Оценить отношение родителей из Индии к вакцинации детей в условиях пандемии COVID-19 и их осведомлённость в вопросах вакцинации.

Методы. В описательном поперечном исследовании методом опроса с помощью Google Форм приняли участие 214 родителей из штата Керала, Индия.

Результаты. Родители из Индии продемонстрировали хорошую приверженность вакцинации, поскольку 98,6 % родителей (95%-й доверительный интервал (95% ДИ): 95,9–99,5) вакцинируют своего ребёнка, а в случаях нарушения графика иммунопрофилактики 84,6 % (95% ДИ: 79,1–88,8) родителей стараются наверстать пропущенную прививку как можно скорее. Большинство индийцев – 68,7 % (95% ДИ: 62,1–74,5) – проводят вакцинацию ребёнка в государственных клиниках, однако 28,5 % (95% ДИ: 22,8–34,8) родителей предпочитают частные медицинские учреждения. Информацию о вакциноуправляемых инфекциях, безопасности вакцин и побочных эффектах большая часть родителей получает от специалистов здравоохранения: 47,2 % (95% ДИ: 40,6–53,8) – от педиатров из государственных учреждений здравоохранения; 50,9 % (95% ДИ: 44,2–57,5) – от педиатров из частных клиник; 10,3 % (95% ДИ: 6,8–15,0) – от врачей альтернативной медицины. Примечательно, что более 80 % индийцев информированы о пользе вакцинопрофилактики через средства массовой информации (83,6 %; 95% ДИ: 78,1–87,9). На фоне хорошего отношения к иммунопрофилактике индийские родители хотят знать больше о вакцинации (63,1 %; 95% ДИ: 56,4–69,2). На недостаточную осведомлённость в вопросах вакцинации также указывает то, что перед вакцинацией ребёнка 21,5 % (95% ДИ: 16,5–27,4) из них не были проинформированы врачом о пользе вакцины для здоровья и возможных рисках.

Выводы. В условиях пандемии COVID-19 родители из Индии (штат Керала) продемонстрировали позитивное отношение к вакцинации детей и недостаточную осведомлённость в вопросах вакцинации.

Ключевые слова: вакцинация, вакцинопрофилактика, дети, родители, отношение к вакцинации, приверженность вакцинации, COVID-19

Для цитирования: Ааромал Сурешкумар, Новикова Е.А., Абхирами Супрасаннан, Ману Кришна, Ваняркина А.С., Москалева Е.В., Казанцева Е.Д., Петрова А.Г., Рычкова Л.В. Отношение и осведомлённость индийских родителей из штата Керала о вакцинации детей в условиях пандемии COVID-19. *Acta biomedica scientifica*. 2023; 8(6): 178-185. doi: 10.29413/ABS.2023-8.6.17

Статья получена: 05.09.2023

Статья принята: 01.12.2023

Статья опубликована: 29.12.2023

INTRODUCTION

Vaccines help protecting children from vaccine-preventable diseases and improve child survival and reduce morbidity. To this day the coverage for many essential vaccines is higher than 80 % [1]. The triple vaccine against diphtheria, tetanus and pertussis (DTP3) is used as the key metric for global vaccination coverage, because it is a good indicator for access to routine immunization services [1]. Global target coverage of children according to the World Health Organization (WHO) should be not less than 90 % with three doses of DTP3 [2]. In conformity with WHO the health Mission Indradhanush of Indian Government has an aim to increase full immunization coverage to 90 % through focus on unvaccinated and partially vaccinated children in pockets of low immunization coverage in high risk and hard-to-reach areas [3].

The rates of vaccination of children around the world and in India inter alia are not sufficient. According to recent reports in 2022 the global vaccination coverage was 84 %, in 2021 – 81 %, in 2020 – 83 % [4], and such low coverage may be explained by impacts of the COVID-19 pandemic. India has not achieved 90 % coverage during the COVID-19 pandemic showing 85 % in 2020 and 2021, in comparison with 91 % in 2019 [1]. Interestingly, at the same time attitude to vaccination remains positive, because 92 % people in the world, and 98 % of Indians think that it is important for children to be vaccinated [1]. Besides 98 % Indian

parents think vaccines are safe, and 78.9 % trust healthcare specialists (Fig. 1).

The Universal Immunization Program in India is provided free of cost by Ministry of Health and Family Welfare. National Immunization Schedule includes 11 vaccines against diphtheria; pertussis; tetanus; polio; measles; tuberculosis; hepatitis; meningitis and pneumonia caused by Haemophilus influenza type B; rubella and rotavirus diarrhea in selected states and Japanese encephalitis in endemic districts [3].

India does not have mandatory vaccination on a national basis; however, vaccination policies differ across states [5]. Even though vaccination policies in India is recommended, not mandatory, because of rumors about health risks on social media, in 2018 Kerala state required schools to submit students' annual vaccination records as a response to a poor turnout for a new measles-rubella vaccine [6]. India puts efforts for creating awareness and community engagement via engagement with key media houses, advocacy with important opinion makers including religious leaders and local influencers, development of a pictorial National Immunization Schedule [3].

This work is a part of the survey of the Laboratory of Infectiology and Immunoprophylaxis in Pediatrics (The Scientific Centre for Family Health and Human Reproduction Problems, Irkutsk, Russia) about attitudes towards children's vaccination of parents from Russia (Irkutsk region) and India (Kerala state) [7–10]. Since we already made in-depth study

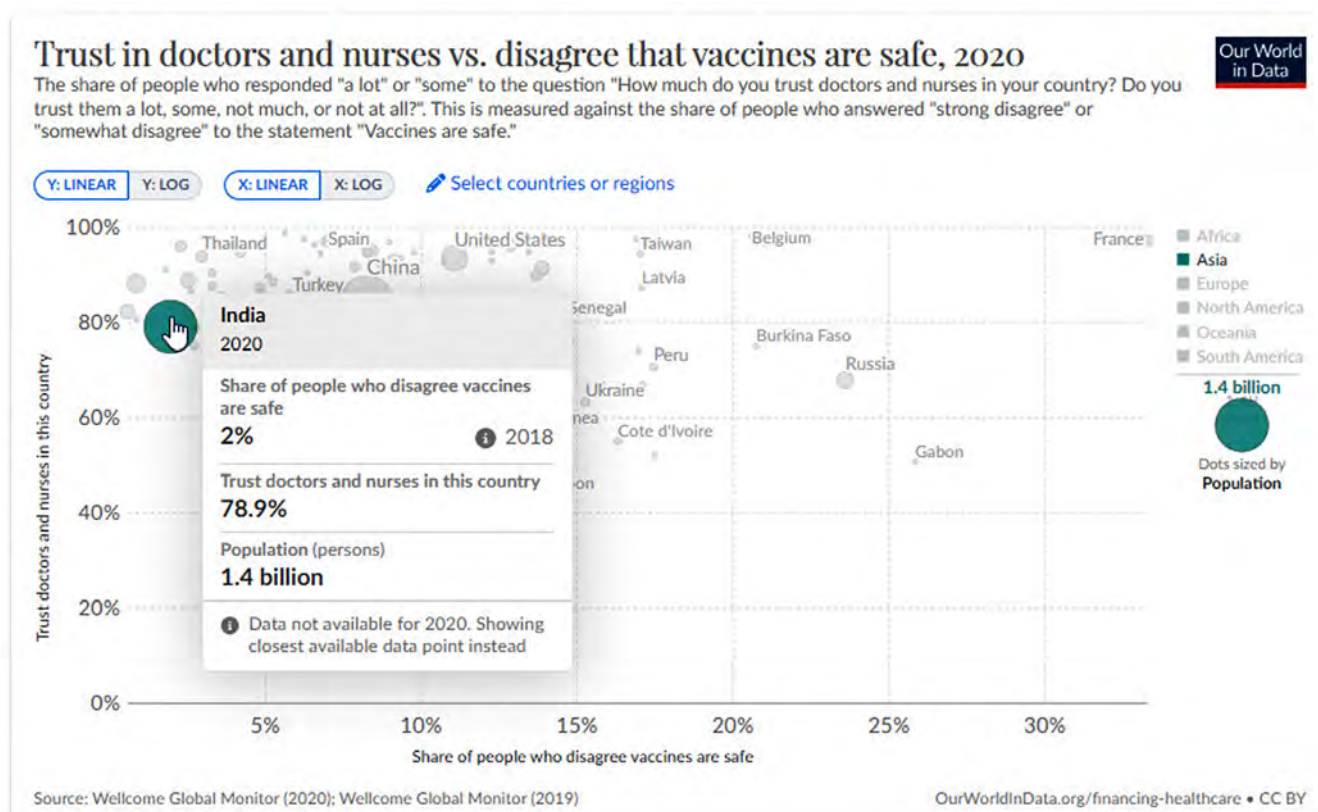


FIG. 1. The opinion of people in India about vaccine safety and their trust in healthcare specialists (The Wellcome Global Monitor, 2020) [1]

that involved Russian parents [7] a purpose of this work was to describe in detail the attitude and awareness of parents from India towards children’s vaccination on the background of COVID-19 pandemic.

METHODS

Two hundred and fourteen participants from India (Kerala state) took part in the descriptive cross-sectional study. The survey was prepared with Google form according to the principles of anonymity. Data were collected during the COVID-19 pandemic from April 1 to July 6, 2020. The questionnaire contained 17 questions with multiple choice options including age (< 20 y.o., 21–30 y.o., 31–40 y.o., > 40 y.o.) and gender of participants, their educational stage (school, college, university), financial situation (lower middle class, middle class, upper middle class, wealthy), occupational status of family members (health worker, teacher, kindergarten worker), number of children (one, two, three, four or more); and questions about awareness and attitude towards vaccination. The link was sent to the heads of the universities and via social media. We obtained 214 responses, and a total of 214 participants were included for final statistical analysis, so the effective response rate was 100 %. There were no responses missing data and responses with obviously false answers.

The study protocol, questionnaire and consent form were approved by the ethics committee of the “Scientific Center for Family Health and Human Reproduction Problems”. Qualitative data were reported as absolute values and percentages. 95 % confidence interval (95% CI) was calculated using the website for statistical computation “VassarStats” [11].

RESULTS AND DISCUSSION

Sociodemographic characteristics of participants are presented in the Table 1. Most of them were women (68.2 %; 95% CI: 61.7–74) and young adults aged 21 to 40 y. o. (79.9 %; 95% CI: 74.0–84.7), university graduates (61.7 %; 95% CI: 55–67.9), belonging to the middle class 66.8 % (95% CI: 60.2–72.7) with one child (65.9 %; 95% CI: 59.3–71.9). Family members of respondents had high education, were health workers (44.9 %; 95% CI: 38.3–51.5), teachers (57.9 %; 95% CI: 51.2–64.3) or kindergarten workers (30.4 %; 95% CI: 0.16–0.24).

Attitude and awareness of Indian parents towards vaccination is shown in the Table 2. Parents’ attitude towards vaccinations during the COVID-19 pandemic was positive. Almost all Indians in Kerala state supported children’s vaccination and vaccinated their children (n = 211; 98.6 %; 95% CI: 95.9–99.5), and only 1.4 % (n = 3; 95% CI: 0.48–4.04) of parents did not. This data exceeds official numbers of vaccination coverage date cross the country in 2020 (85 %) [1].

TABLE 1
SOCIODEMOGRAPHIC CHARACTERISTICS OF PARTICIPANTS

Variables	N = 214	%	95% CI
Gender			
Male	68	31.8	25.9–38.9
Female	146	68.2	61.7–74
Age			
< 20 y. o.	3	1.4	0.5–4.0
21–30 y. o.	85	39.7	33.4–46.4
31–40 y. o.	86	40.2	33.8–46.8
> 40 y. o.	40	18.7	14.0–24.4
Educational stage			
School	17	7.9	5.0–12.3
College	65	30.4	24.6–36.8
University	132	61.7	55–67.9
Financial situation			
Poverty	1	0.5	0.08–2
Lower middle class	7	3.3	1.5–6.6
Middle class	143	66.8	60.2–72.7
Upper middle class	47	22	16.9–27.9
Wealthy	16	7.5	4.6–11.8
Occupational status of family members			
Health workers	96	44.9	38.3–51.5
Teachers	124	57.9	51.2–64.3
Kindergarten workers	65	30.4	0.16–0.24
None of these	37	17.3	24.6–36.8
Number of children			
One	141	65.9	59.3–71.9
Two	56	26.2	20.7–32.4
Three	15	7	4.2–11.2
Four and more	2	0.9	0.2–3.3

Note. y. o. – years old; 95% CI – 95 % confidence interval; N – number of participants.

TABLE 2
ATTITUDE AND AWARENESS OF INDIAN PARENTS TOWARDS VACCINATION

Variables	N	%	95% CI
Describe your attitude towards vaccinations.			
I follow Immunization Schedule and know about the time of vaccinations	198	92.5	88.2–95.3
I don't follow Immunization Schedule and don't know about the time of vaccinations, our doctor cares about the Immunization Schedule	13	6.1	3.5–10.1
I don't vaccinate my child	3	1.4	0.48–4.04
If you ever rescheduled vaccinations, have you vaccinated children after resolving conditions?			
Yes, I try to vaccinate my child as soon as possible	181	84.6	79.1–88.8
No, I don't want to overload the child's immune system	12	5.6	3.2–9.5
No, I never reschedule vaccinations	21	9.8	6.5–14.5
Where do you go to get vaccinated your child?			
State clinics without a fee	147	68.7	62.1–74.5
Private clinics with a fee for getting vaccinated	61	28.5	22.8–34.8
Other	6	2.8	1.2–5.9
Before vaccination			
A doctor informs about the disease that can be prevented by the vaccine, about vaccine safety, and side effects	140	65.4	58.8–71.4
A doctor informs only about the disease that can be prevented by the vaccine	28	13.1	9.2–18.2
A doctor gives no information	46	21.5	16.5–27.4
Where do you get information about vaccinations?			
From a pediatrician working in a private clinic	109	50.9	44.2–57.5
From a pediatrician working in the public health system	101	47.2	40.6–53.8
From doctors of other specialty	62	29.0	23.3–35.3
From a homeopath	22	10.3	6.8–15.0
From friends/relatives with a medical background	129	60.3	53.6–66.6
From friends/relatives without a medical background	18	8.4	5.3–12.9
From mass-media (television, radio, newspapers, and magazines)	179	83.6	78.1–87.9
From Internet/social network	113	52.8	46.1–59.3
From Flyers and disk	2	0.9	0.25–3.3
Do you want to know more about vaccination?			
Yes	135	63.1	56.4–69.2
No	79	36.9	30.7–43.5

Note. y. o. – years old; 95% CI – 95 % confidence interval; N – number of participants.

Among those parents who vaccinated children ($n = 211$) 92.5 % (95% CI: 88.2–95.3) followed the Indian Immunization Schedule and knew about the time of vaccinations, but 6.1 % (95% CI: 3.5–10.1) preferred not to care about the schedule. If vaccination appointment had to be rescheduled 84.6 % (95% CI: 79.1–88.8) of Indians vaccinated children later, and just 5.6 % (95% CI: 3.2–9.5) did not want to overload the child's immune system and cancelled vaccine intake.

The sources of information about vaccination for Indians were numerous. Pediatricians provided parents with all necessary information (98.1 %; 95% CI: 95.2–99.2). Among these 47.2 % pediatricians worked in the public health system (95% CI: 40.6–53.8), and 50.9 % (95% CI: 44.2–57.5) – in private clinics. According to The Wellcome Global Monitor, Indians consider healthcare specialists as a reliable source of information (Fig. 1), and our results confirm this. Besides, it is worth noting that 10.3 % (95% CI: 6.8–15.0) of parents got informed about vaccination from homeopaths as complementary and alternative medicine practitioners. Homeopathy is included in the six Indian systems of medicine prevalent and practiced in India that is called AYUSH (Ayurveda, Yoga and Naturopathy, Unani, Siddha, and Homeopathy) [12]. Positive attitude towards vaccination from the alternative medicine specialists whom people trust besides healthcare professionals provides adherence to national immunization in India.

Along with this most of Indians got informed about vaccinations through mass-media (83.6 %; 95% CI: 78.1–87.9), especially Internet/online social media (52.8 %; 95% CI: 46.1–59.3). There is a global trend when people are asking questions about vaccines and are looking for answers online [1]. Since India has high immunization coverage our data demonstrates excellent work of mass communication in India during the COVID-19 pandemic.

All vaccines are given free of charge under the National Immunization Schedule, and so most of Indians (68.7 %; 95% CI: 62.1–74.5) preferred to vaccinate children in state clinics without a fee, however, some of them chose private-pay clinics 28.5 % (95% CI: 22.8–34.8). Private clinics provide around 21 % of vaccinations in urban centers of India and are important partners in achieving high vaccination coverage [13]. Meanwhile private physicians may contribute to the low vaccination coverage, because they do not strictly follow vaccination schedules if there are concerns about parents' ability to pay (45 % of physicians), and do not administer more than two injections in the same visit (60 %) [13].

Before vaccination 65.4 % (95% CI: 58.8–71.4) of parents had been warned by a doctor about diseases that can be prevented by vaccines and risks of vaccinating kids; 13.1 % (95% CI: 9.2–18.2) of parents were informed only about diseases that vaccines can prevent; 21.5 % (95% CI: 16.5–27.4) of parents were not informed by a doctor at all. Getting no information from doctors in turn leads to poor parental awareness. Reasonably 63.1 % (95% CI: 56.4–69.2) of Indian parents in our survey wanted to know more about vaccination. It may be ex-

plained by low awareness of doctors themselves about vaccination health benefits. Multicenter cross-sectional survey revealing awareness and attitude of Indian healthcare providers towards annual influenza vaccination showed that 42.95 % of physicians had low level of awareness about influenza vaccination ($n = 780$) [14]. Physicians did not prescribe influenza vaccines to patients due to fear of side effects (16.54 %), cost (15.64 %), lack of awareness about availability (15.38 %), absence of belief that it is beneficial (14.36 %), history of side effects (13.46 %), and patients' fear of needles (11.28 %) [14]. This indicates the need to expand vaccine awareness campaigns in India and pay attention to educational strategies among physicians. From the experience of Russian colleagues (S.D. Timoshkova et al.), the immunization training course for doctors not only raises their vaccination awareness but improves vaccination coverage [15]. After two years training of pediatricians at the Moscow Outpatient Department immunization coverage of children attached to this department increased for whooping cough and measles by 11 % and for rubella by 4 %.

When analyzing sociodemographic characteristics of participants, their attitude and awareness towards vaccination we have found some studies demonstrating that younger and more educated parents are less positive about vaccination [16], but we did not find any confirmation of that. In our study, most parents (more than 60 %) were young and well educated, however they had good adherence to children vaccination.

CONCLUSION

Indian parents supported children vaccination and had good attitude towards vaccines of the National Immunization Schedule in the COVID-19 pandemic. Mass media along with healthcare specialists promoted adherence to childhood immunization for Indians. However, parents consider their awareness about children's vaccination as poor, which may be explained by insufficient knowledge of doctors in vaccination questions. Increasing vaccination compliance of Indian healthcare specialists will provide better awareness and vaccination coverage in India.

Acknowledgments

We thank the Clinic of Scientific Centre of Family Health and Human Reproduction Problems (Irkutsk, Russian Federation) for the assistance.

Disclosure and conflict of interest

The authors declare no potential conflicts of interest.

REFERENCES

1. *Our world in data. Vaccination*. URL: <https://ourworldindata.org/vaccination> [date of access: 05.09.2023].

2. World Health Organization. *Global vaccine action plan 2011–2020*. URL: <https://www.who.int/teams/immunization-vaccines-and-biologicals/strategies/global-vaccine-action-plan> [date of access: 05.09.2023].
3. Ministry Of Health and Family Welfare of India. *Universal Immunization Programme (UIP)*. URL: <https://main.mohfw.gov.in/Major-Programmes/universal-immunization-programme-uip> [date of access: 05.09.2023].
4. Pan American Health Organization. WHO/UNICEF estimate of national immunization coverage 2022: Factsheet. URL: <https://www.paho.org/en/documents/factsheet-whounicef-estimate-national-immunization-coverage-2022> [date of access: 05.09.2023].
5. Vanderslott S, Marks T. Charting mandatory childhood vaccination policies worldwide. *Vaccine*. 2021; 39(30): 4054–4062. doi: 10.1016/j.vaccine.2021.04.065
6. *Kerala government makes vaccination compulsory for admissions to Class 1*. 2018. URL: <https://scroll.in/latest/869483/kerala-government-makes-vaccination-compulsory-for-admissions-to-class-1> [date of access: 05.09.2023].
7. Vanyarkina AS, Petrova AG, Bayanova TA, Kazantseva ED, Krivolapova OA, Bugun OV, et al. Preventive vaccination in children: Parents' knowledge or physician's competence. *Pacific Medical Journal*. 2019; 3: 23–28. (In Russ.). doi: 10.34215/1609-1175-2019-4-23-28
8. Novikova EA, Krishna M, Sureshkumar Aaromal A, Suprasannan A, Vanyarkina AS, Moskaleva EV, et al. Comparison of attitude of Indian and Russian parents to children's vaccination. *Acta biomedica scientifica*. 2022; 7(5-1): 12–18. (In Russ.). doi: 10.29413/ABS.2022-7.5-1.2
9. Bayanova TA, Petrova AG, Vanyarkina AS, Kupriyanova NYu, GavriloVA TA. Adherence population to vaccination of influenza: Survey results. *Epidemiology and Vaccinal Prevention*. 2021; 20(1): 69–75. (In Russ.). doi: 10.31631/2073-3046-2021-20-1-69-75
10. Kazantseva ED, Petrova AG, Vanyarkina AS, Bayanova TA, Novikova EA. Commitment of parents and doctors of Irkutsk city to vaccination against tick-borne encephalitis. *Acta biomedica scientifica*. 2020; 5(6): 286–291. (In Russ.). doi: 10.29413/ABS.2020-5.6.39
11. *VassarStats: Website for Statistical Computation*. URL: <http://vassarstats.net> [date of access: 9.10.2023].
12. Kaur H, Chalia DS, Manchanda RK. Homeopathy in public health in India. *Homeopathy*. 2019; 108(2): 76–87. doi: 10.1055/s-0038-1673710
13. Hagan JE, Gaonkar N, Doshi V, Patni A, Vyas S, Mazumdar V, et al. Knowledge, attitudes, and practices of private sector immunization service providers in Gujarat, India. *Vaccine*. 2018; 36(1): 36–42. doi: 10.1016/j.vaccine.2017.11.046
14. Vora A, Shaikh A. Awareness, attitude, and current practices toward influenza vaccination among physicians in India: A multicenter, cross-sectional study. *Front Public Health*. 2021; 9: 642636. doi: 10.3389/fpubh.2021.642636
15. Timoshkova SD, Rusinova DS, Elagina TN, Glazkova GP, Fedosenko MV, Namazova-Baranova LS. Changes in the preventive vaccination procedures in children's city outpatient's clinic and its efficacy. *Current Pediatrics*. 2023; 22(2): 207–214. (In Russ.). doi: 10.15690/vsp.v22i2.2563
16. Jones AM, Omer SB, Bednarczyk RA, Halsey NA, Moulton LH, Salmon DA. Parents' source of vaccine information and impact on vaccine attitudes, beliefs, and non-medical exemptions. *Adv Prev Med*. 2012; 2012: 932741. doi: 10.1155/2012/932741

Information about the authors

- Ajitha Sureshkumar Aaromal** – MD, Resident at the Department of Neurosurgery, Irkutsk State Medical University, e-mail: aaromalas@gmail.com, <https://orcid.org/0000-0002-8655-1780>
- Evgenia A. Novikova** – Junior Research Officer at the Laboratory of Infectology and Immunoprophylaxis, Scientific Centre for Family Health and Human Reproduction Problems, e-mail: europe411@mail.ru, <https://orcid.org/0000-0002-9353-7928>
- Suprasannan Abhiramy** – MD, Volunteer at the Laboratory of Infectology and Immunoprophylaxis, Scientific Centre for Family Health and Human Reproduction Problems, e-mail: abhiramyroses@gmail.com, <https://orcid.org/0000-0001-5343-3019>
- Maniyana Girija Manu Krishna** – MD, Student of the Master Global Health, University of Barcelona, e-mail: manumedic27@gmail.com, <https://orcid.org/0000-0002-4843-6538>
- Anastasiya S. Vanyarkina** – Cand. Sc. (Med.), Research Officer at the Laboratory of Infectology and Immunoprophylaxis, Scientific Centre for Family Health and Human Reproduction Problems, e-mail: nasty-191@yandex.ru, <https://orcid.org/0000-0001-8434-1600>
- Ekaterina V. Moskaleva** – Cand. Sc. (Med.), Research Officer at the Laboratory of Infectology and Immunoprophylaxis, Scientific Centre for Family Health and Human Reproduction Problems, e-mail: mkatena@mail.ru, <https://orcid.org/0000-0003-4196-0713>
- Ekaterina D. Kazantseva** – Clinical Research Assistant at the Laboratory of Infectology and Immunoprophylaxis, Scientific Centre for Family Health and Human Reproduction Problems, e-mail: kat.smile7@yandex.ru, <https://orcid.org/0000-0003-0692-2295>
- Alla G. Petrova** – Dr. Sc. (Med.), Professor, Head of the Laboratory of Infectology and Immunoprophylaxis, Scientific Centre for Family Health and Human Reproduction Problems, e-mail: rudial75@gmail.com, <https://orcid.org/0000-0002-7965-8061>
- Lyubov V. Rychkova** – Dr. Sc. (Med.), Professor of the RAS, Corresponding Member of the RAS, Director, Scientific Centre for Family Health and Human Reproduction Problems, e-mail: iphr@sbamsr.irk.ru, <https://orcid.org/0000-0002-0117-2563>

Сведения об авторах

- Сурешкумар Ааромал** – MD, ординатор кафедры нейрохирургии, ФГБОУ ВО «Иркутский государственный медицинский университет» Минздрава России, e-mail: aaromalas@gmail.com, <https://orcid.org/0000-0002-8655-1780>
- Новикова Евгения Анатольевна** – младший научный сотрудник лаборатории инфектологии и иммунопрофилактики в педиатрии, ФГБНУ «Научный центр проблем здоровья семьи и репродукции человека», e-mail: europe411@mail.ru, <https://orcid.org/0000-0002-9353-7928>
- Супрасаннан Абхирами** – MD, волонтер лаборатории инфектологии и иммунопрофилактики в педиатрии, ФГБНУ «Научный центр проблем здоровья семьи и репродукции человека», e-mail: abhiramyroses@gmail.com, <https://orcid.org/0000-0001-5343-3019>
- Кришна Ману** – MD, студент магистратуры по глобальному здравоохранению, Университет Барселоны, e-mail: manumedic27@gmail.com, <https://orcid.org/0000-0002-4843-6538>

Ваняркина Анастасия Сергеевна – кандидат медицинских наук, научный сотрудник лаборатории инфектологии и иммунопрофилактики в педиатрии, ФГБНУ «Научный центр проблем здоровья семьи и репродукции человека», e-mail: nasty-191@yandex.ru, <https://orcid.org/0000-0001-8434-1600>

Москалева Екатерина Владимировна – кандидат медицинских наук, научный сотрудник лаборатории инфектологии и иммунопрофилактики в педиатрии, ФГБНУ «Научный центр проблем здоровья семьи и репродукции человека», e-mail: mkatena@mail.ru, <https://orcid.org/0000-0003-4196-0713>

Казанцева Екатерина Дмитриевна – лаборант-исследователь лаборатории инфектологии и иммунопрофилактики в педиатрии, ФГБНУ «Научный центр проблем здоровья семьи и репродукции человека», e-mail: kat.smile7@yandex.ru, <https://orcid.org/0000-0003-0692-2295>

Петрова Алла Германовна – доктор медицинских наук, профессор, заведующая лабораторией инфектологии и иммунопрофилактики в педиатрии, ФГБНУ «Научный центр проблем здоровья семьи и репродукции человека», e-mail: rudial75@gmail.com, <https://orcid.org/0000-0002-7965-8061>

Рычкова Любовь Владимировна – доктор медицинских наук, профессор РАН, член-корреспондент РАН, директор, ФГБНУ «Научный центр проблем здоровья семьи и репродукции человека», e-mail: iphr@sbamsf.irk.ru, <https://orcid.org/0000-0002-0117-2563>