ORIGINAL ARTICLE

PARENTS' ATTITUDES REGARDING CHILDHOOD VACCINATION WITH FOCUS ON ROTAVIRUS VACCINATION IN BISHKEK, KYRGYZSTAN

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ABSTRACT

The aim of this study is to determine the parental attitudes regarding childhood vaccinations with focus on rotavirus vaccination. It is a cross-sectional study using the Parent Attitudes about Childhood Vaccines (PACV) questionnaire. This study was conducted among parents, who have at least one child in Bishkek city, Kyrgyzstan, that began on April 4th 2023 - 4th May 2023. At enrollment, parents completed the PACV questionnaire, to screen for vaccine hesitancy. PACV is a questionnaire that includes 15 questions with three factor domains: "General attitudes", "Behavior" and "Safety and efficacy". The prevalence of vaccine hesitancy was 21,3% among the participants in this study. Parents had concerns about safety of vaccine shots 19,9%, side effects of rotavirus vaccine 24,8%, efficacy of rotavirus vaccine 13,6% and the number of administered vaccines (18,1% to get fewer vaccines and 29,8% for more shot). This study investigates the differences in childhood and rotavirus vaccine hesitancy by ethnicity (p=0.01) and educational background (p=0.04). The study findings show that there is a vaccine hesitancy among the parents (21,3%) in Bishkek city regarding childhood vaccination and rotavirus vaccine. Concerns of the parents were mostly associated with vaccine shots safety in general, as well as about the side effects and efficacy of rotavirus vaccine.

***Key words**: childhood vaccination, vaccine hesitancy, rotavirus vaccination, attitudes, Kyrgyzstan*

INTRODUCTION

Vaccination is one of the main preventive measures in national health care systems. Over the past years newer vaccines have been rapidly introduced or are under the consideration to be introduced into the National Immunization Programmes (NIPs) across the globe. There is an established system of immunization in Kyrgyzstan, with coverage rates of more than 96% of the population for main types of antigens. However, there are still emerging infections that continue causing high rates of mortality and morbidity among the population and that requires immediate bold actions at the country level.

Globally, rotaviruses are the leading cause of severe, dehydrating diarrhea in children under five years of age that led to about 500 000 childhood deaths. It is also the reason of big amount of hospitalizations which were about 2 million in 2000[1,2]. According to WHO estimates, about 215,000 children under five years die each year from rotavirus infections and with majority of cases in children from low-income countries. In Kyrgyzstan, approximately 54 deaths occur from rotavirus annually among children under five years[3]. And according to WHO estimates, about 40% of hospitalizations in Kyrgyzstan are attributable to rotavirus infection[4]. The burden of rotavirus infection is supported by studies from other countries. The study regarding the significance of burden of rotavirus infection conducted in Libya, demonstrated high incidence of rotavirus diarrhea among children aged 5 years and below[5]. Another study regarding rotavirus vaccination among children conducted in Libya have identified, that 57% of diarrhea that is treated in hospital, was caused by rotavirus infection in Libyan children under 5 years old[6]. Severe rotavirus burden and rotavirus-related mortality across the globe require effective interventions[7]. Thus, the introduction to the National Immunization Schedules of rotavirus vaccines is recommended by World Health Organization (WHO) since 2009. The Ministry of Health of Kyrgyzstan has introduced RotaSiilTM, based on successful roll-outs in India, Niger and Uzbekistan[7,8]. Over the past years India was considered as a reliable producer of vaccines, which are WHO pre-qualified with safety, high quality and effectiveness ensured[9,10].

Distribution and development of vaccines considered to be public health' greatest achievements, leading to child survival and improved health outcomes globally[11,12]. The Global Vaccine Action Plan (GVAP) for 2011-2020, set

targets for childhood vaccinations, i.e. to reach 90% vaccination coverage with all vaccines in the NIPs by 2020[13]. The Immunization Agenda 2030 which is the GVAP's successor, was developed to further increase and ensure an equitable access to all routine vaccinations, and proposed to increase the number of zero-dose children who have missed by current immunization programmes in every country by 2030[14,15]. Therefore, maintaining and sustaining high vaccination coverage is vital for Immunization Agenda 2030 targets achievement[16,17]. However, the fast production, distribution and introduction of new vaccines into NIPs has raised questions, possible suspicions, concerns among the population that all somehow may influence the parenteral acceptance of childhood vaccines. Thus, in order to develop and test interventions to address these barriers it is crucial to understand the barriers of immunization acceptance among vaccine-hesitant parents (VHP). Vaccine hesitancy is very complex and may appear with different vaccines, different time and place. Vaccination delay or refusal may be as a result of such factors as confidence in vaccines, complacency or convenience[18]. Sustaining high vaccination rates is a priority for National Immunization Programmes. It is therefore important to address such barriers as vaccine hesitancy as a growing issue globally[18]. The aim of this study is to assess the attitudes of parents of Kyrgyzstan and concerning childhood vaccination with a focus on rotavirus vaccine.

MATERIALS AND METHODS

This study was designed as a cross-sectional study. Quantitative method was used in order to assess and analyze the attitudes of parents regarding the childhood vaccination with focus on rotavirus vaccine. Data for the study was based on the Parent Attitudes about Childhood Vaccines (PACV) questionnaire, that included 15 questions with three factor domains: "General attitudes", "Behavior" and "Safety and efficacy". The target population were parents with children. Participants were selected using convenient sampling technique from Bishkek city of Kyrgyzstan. The PACV questionnaire was translated into Russian and Kyrgyz languages prior to the distribution among the study respondents. The data was collected through google survey between April 2023 - May 2023, with the description of the objective of this survey distributed through social media (What 'sap and Facebook). The privacy of participants was kept and the questionnaire did not include personal information, such as name, address, phone number and email address. Participants were also informed that they have full right to discontinue or refuse to participate in the study. The survey was adapted for the use in the Kyrgyzstan context, e.g., education level (primary school 4 years, lower secondary school 5 and upper secondary school 2 years, bachelor degree and master's degree/PhD).

IBM SPSS Statistics version 23.0. was used to analyze the data. Each of the 15 PACV survey items according to the Opel et al.'s approach[19] was scored as follows: hesitant responses are assigned as 3, 'don't know or not sure' as 2, and non-hesitant responses as 1. Item scores were summed in an unweighted fashion to obtain a total raw score. The total raw score was then converted to a scale ranging from 0 (least hesitant) to 100, indicating the highest level of vaccine hesitancy, using simple linear transformation, with a score < 50 that identified non-hesitant parents, while a score ≥ 50 that identified vaccine hesitant parents. For significancy level we used p= 0.05 and Chi Square was used.

RESULTS

Total 411 participants have completed the questionnaire. However, the database cleaning process have revealed some missing answers in questionnaire items and 8 participants were excluded from the data analysis, finally 403 participants were included into this analysis.

Participants' socio-demographic characteristics

The most commonly reported age range was 30-39 years (36%) and female participants made up the majority of this study (62,5%), the majority were married (75,4%), and the majority of the participants were Kyrgyz parents (74,4%). More than half of participants had bachelor's degree (60%). The majority of respondents had 2 – 3 children (67,7%) Table 1.

Overall, 21,3% (n = 86) of participants were identified as vaccine hesitant and 78,7% (n=317) of non-hesitant parents (Table 1). The Chi-Square test has revealed that there were statistically significant differences in childhood and rotavirus vaccine hesitancy by ethnicity (p=0.01). Kyrgyz participants were more vaccine hesitant compared to other ethnic groups and educational background (p=0.04) of the participants, the highest hesitancy was found among bachelor degree graduated parents followed by secondary school graduated parents. There were no statistically significant differences by other socio-demographic characteristics of the participants (p value > 0.05).

TABLE 1: The level of vaccine hesitancy among study respondents by socio-demographic characteristics.

Variable	Vaccine hesitancy				P value
	Non-hesitant		Hesitant		
	F	%	F	%	
Age range (years)					.584
18-29	35	8.7	6	1.5	
30-39	114	28.3	31	7.7	
40-49	93	23.1	24	6	
50 and above	75	18.6	25	6.2	
Gender					.430
Male	120	29.8	31	7.7	
Female	197	48.9	55	13.6	
Ethnicity					.016
Kyrgyz	245	60.8	55	13.6	
Russian	37	9.2	20	5	
Other	35	8.7	11	2.7	
Marital status					.386
Married	244	60.5	60	14.9	
Divorced	54	13.4	19	4.7	
Widower/widow	19	4.7	7	1.7	
Occupational status					.474
Healthcare worker	34	8.4	4	1	
Housewife	58	14.4	16	4	
Government servant	47	11.7	12	3	
Private sector	90	22.3	25	6.2	
Other	88	21.8	29	7.2	
Educational level					.043
Illiterate	1	0.2	1	0.2	
Primary school	2	0.5	2	0.5	
Lower and upper secondary school	63	15.6	28	6.9	
Bachelor's degree	198	49.1	44	10.9	
Master's degree/PhD	53	13.2	11	2.7	
Number of children					.279
1 child	64	15.9	16	4	
2-3 children	218	54.1	55	13.6	
4 children and more	35	8.7	15	3.7	
Total	317	78.7	86	21.3	.410

*Chi-Square test - P value = 0.05

Parenteral attitudes about vaccination

A summary infographic of individual survey items and results depicting vaccine hesitancy is provided above in the Figure 1. Overall, 78,7% of survey respondents held positive attitudes towards childhood vaccination and considers vaccine-preventable diseases to be severe and vaccines against these diseases to be effective. The vast majority of respondents recognized the efficacy of vaccines. Overall, 72,7% of respondents believed that it would be better for their children to get a shot of rotavirus vaccine rather than to develop immunity by getting sick. Only, 8,2% were "disagree" or "strongly disagree". 88,8% of parents also recognized the importance of following the recommended shot schedule of rotavirus vaccine. 73,7% of parents indicated them self as "not hesitant at all" and "not too hesitant" regarding childhood vaccine shots. Further, only 3,7% of parents reported delaying a vaccination for their child for reasons other than illness or allergy, and 4,2% reported deciding not to have their child get a rotavirus vaccine shot for reasons other than illness or allergy.

Vaccine hesitancy

Parents' answers to the 15 items (PACV) used to calculate the vaccine hesitancy score presented in the Figure 1. Overall, parents' answers in this study were generally in favor of vaccines including vaccination against rotavirus infection. However, results of our study showed that parents had concerns regarding safety and efficacy of vaccines. 24,8% of parents were concerned if their children will have a serious side effect from a shot of rotavirus vaccine and 18,6% of parents were not

sure. Moreover, 19,9% of parents were "somewhat concerned" and "very concerned" regarding the safety of vaccine shots. Furthermore, 27,2% of respondents had concerns whether rotavirus vaccine is enough efficient to prevent the disease. The vast majority of respondents were not sure whether the illnesses that shots prevent are severe. The highest number of vaccine hesitant participants (29,8%) and "not sure" answers (38,7%) was associated with the number of vaccine shots to their children. 71,7% participant was not sure if it is better to get fewer vaccines at the same time. PACV questionnaire scores of participants are presented in the figure 2. The findings of the survey demonstrated the majority of participants were non-hesitant to childhood vaccination. The highest scores were reported by 53 participants who got 47 scores while 48 participants got 45 scores. Only few participants got more than 58 scores in this study.

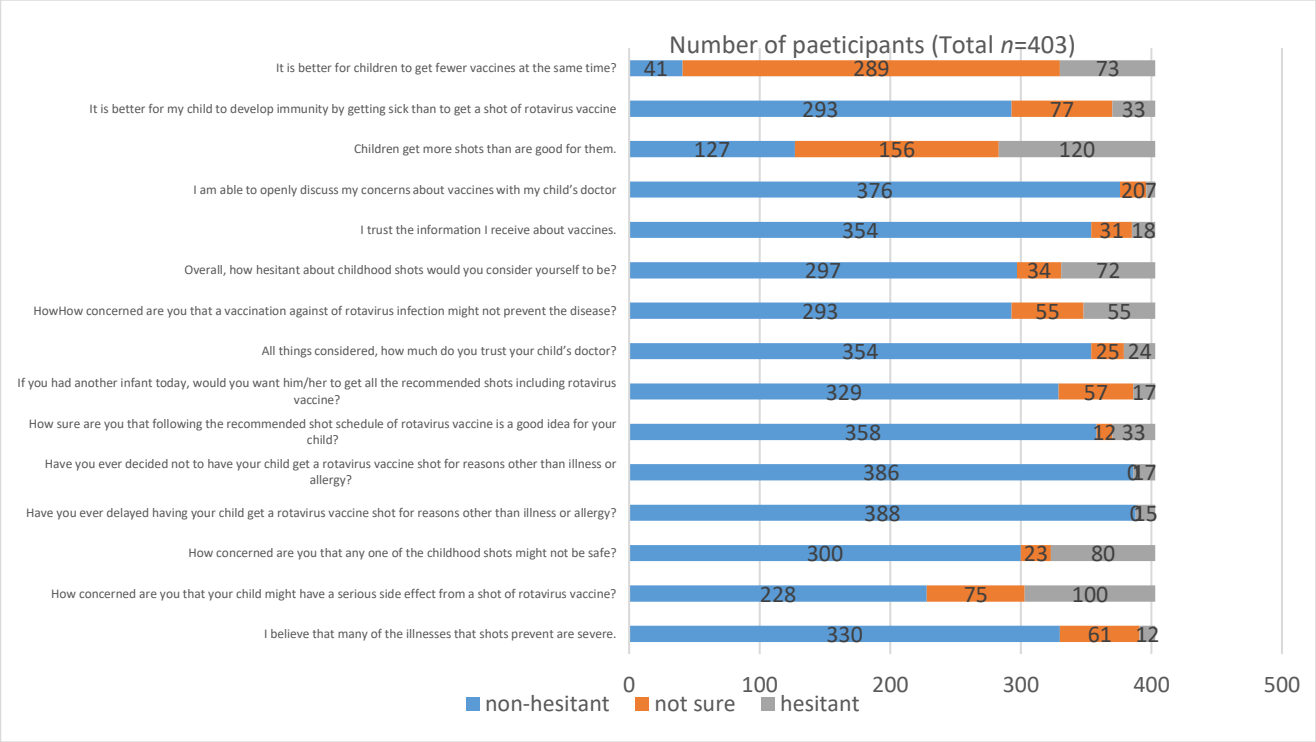

FIGURE 1. Responses to individual PACV survey items

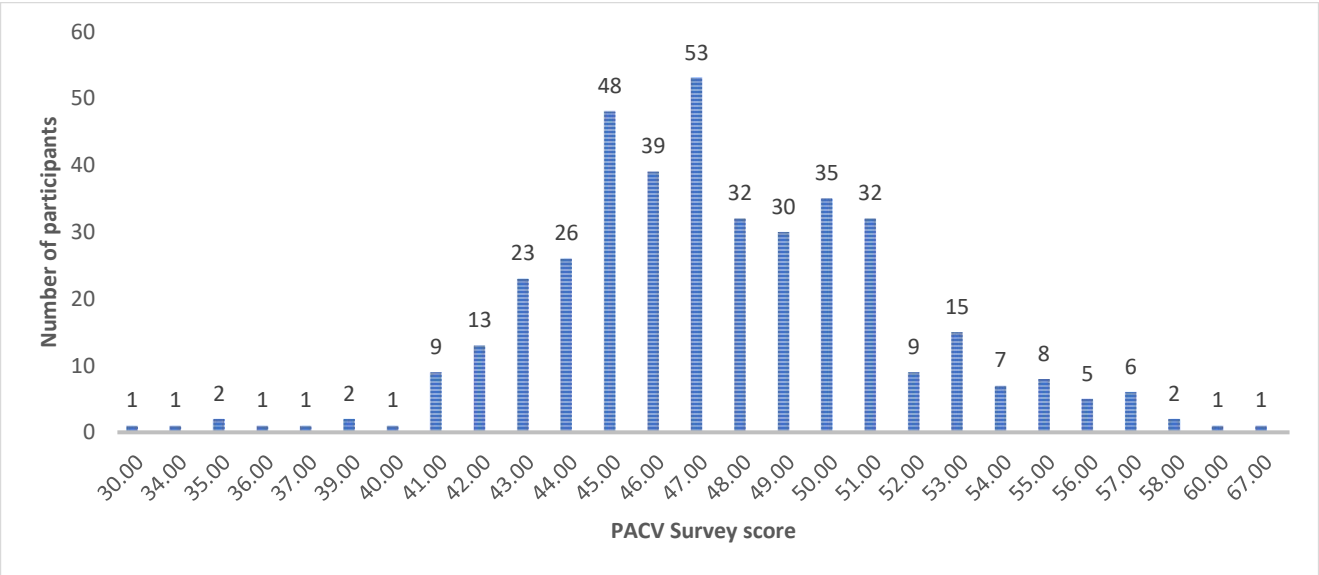

FIGURE 2. PACV questionnaire scores of participants.

DISCUSSION

In this study we have gathered essential information about parents' general attitudes, behavior and intentions about vaccination with different educational and occupational backgrounds with at least one child. Our findings show that most parents (78,7%) held positive attitudes toward vaccination, while 21,3% of participants were vaccine hesitant. The similar findings were observed in the study conducted in Türkiye, where 72,2% of parents had good attitudes about the vaccination of their children[20]. It is noteworthy that despite the relatively high level of parents that considered to be hesitant regarding childhood shots (21,3%), they still decide to follow the recommended shot schedule including rotavirus vaccine and represented 88,8% of parents in our study. However, in our study 71,7% of respondents were not sure if it is better for their children to get fewer vaccine at the same time, as well as another 18,1% of parents were strongly disagreeing with this statement. The highest number of vaccine hesitant responses in our study were associated with the item saying children get more shot than are good for them with 29,8% of parents who were strongly disagree with this and 38,7% of parents who were not sure. These findings may be associated with insufficient or inappropriate level of knowledge regarding vaccine-preventable diseases and immunization, misinformation and miscommunication about vaccination among participated parents or lack of communication with healthcare practitioners. These findings are in line with one of the conducted studies, aimed to understand the psychological determinants of parents' acceptance to vaccinate their children with rotavirus vaccine. Study results demonstrated that parents increasingly became aware and supportive about the national vaccination program recommendations and specifically when this was delivered by healthcare practitioners, as healthcare providers are knowledgeable and hold positive attitudes towards rotavirus vaccination and national immunization programmes generally[21]. This study is one of the examples reiterating that proper communication and work between healthcare providers and general population is crucial in order to avoid unnecessary delays or rejections to vaccinate their children and thus to ensure high vaccination coverage.

Although, the prevalence of non-hesitant respondents was relatively high, 21,3% of parents had a score of 50 or higher on the PACV scale that represents a high level of vaccine hesitancy, this also indicates that vaccine hesitancy is an important issue in Bishkek. These findings are comparable with other prevalence studies that used PACV instrument to determine vaccine hesitancy rates. For instance, results of the study using PACV in Irish population[22] showed that 6,7% of parents were vaccine hesitant. Another study conducted in Quebec, Canada[23] showed that 15% of parents hesitant about the vaccination of their children. In Malaysia[24], findings of another cross-sectional survey showed 11,6% of vaccine hesitant parents. There were different rates of vaccine hesitancy in different similar studies, for example in Seattle [25] with 26% of vaccine hesitant parents and also in Italy with 35% of parents that represents a higher level of vaccine hesitancy.

In this study the issues that parents were mostly concerned about were doubts in safety of vaccine shots with 19,9% of vaccine hesitant parents and also doubts in believing that many of the illnesses that shots prevent are severe with 15,1% of parents responding "not sure" and 3% who were of "strongly disagree". There were also concerns regarding rotavirus vaccination, in particular regarding the side effects of rotavirus vaccine, representing 24,8% of vaccine hesitant parents. 13,6% of parents responded "not sure" and 13,6% "very concerned", thus have expressed concerns in rotavirus vaccine efficacy that allegedly might not prevent the disease. These findings are in line with the study results that was conducted in 2014, aimed to determine parental preferences regarding rotavirus vaccination of their child. The study found that parents were mostly being driven by out-of-pocket costs, vaccine effectiveness, frequency of severe side effects and duration of protection. Parents were even willing to accept lower effectiveness of vaccine if this would imply a lower frequency of severe side effects 1 in 1,000,000 instead of 1 in 10,000[26].

Another cross-sectional study has been conducted in Ethiopia, assessing the vaccine hesitancy regarding COVID-19 vaccine and it's reasons that identified high vaccine hesitancy rates associated with fear of side effects and vaccine effectiveness[27]. But again, 81,6% of parents declared that would vaccinate future children, which suggests that while parents have concerns in number of vaccine shots at the same time, vaccine safety and side effects, they may still choose to vaccinate their children despite these concerns. The fear of side effects is one of the most frequent reasons when parents refusing at least one shot of a vaccine for their children. This statement is supported by previous studies and considered as an important barrier for vaccine uptake. The results of the multivariate regression analysis of a cross-sectional study conducted in Italy[26,27] showed that vaccine hesitancy was more likely among parents who were worried about the side effects and vaccine safety. Therefore, increasing parental

knowledge about vaccine safety and importance of childhood vaccination through educational materials and healthcare workers must be a priority[21]. Interestingly, the biggest number of parents expressing concerns in vaccine safety were with high level of education, i.e. with bachelor degree (51,6%) following by participants graduated from lower and upper secondary school with 9 or 11 years of education (19,4%). Results of our study also revealed a big difference among participants with different ethnicities, Kyrgyz by ethnicity participants made up the major proportion (13,6%) of vaccine hesitant participants. Similar study was conducted in USA that assessed parental vaccine hesitancy and examined differences in coverage owing to hesitancy by ethnicity. Study results revealed that hesitancy towards childhood vaccines was associated with child's ethnicity/race and educational level of mothers. Study results demonstrated that non-Hispanic white population were less vaccine-hesitant (16,4%) compared to non-Hispanic Black (37%) and Hispanic (30,1%). Moreover, study revealed that mothers with less then a high school education were more likely to be vaccine hesitant (31,9%) then mothers with college education and above (13%)[30]. Further, noteworthy that among the healthcare workers participated in this survey were the lowest number of vaccine hesitant responses, which may be assumed with the nature of their profession and knowledge on health-related issues.

These results are supported by the study aimed to examine healthcare practitioners to deliver the vaccine[21]. Study results demonstrated a general positive attitude in healthcare providers to deliver national vaccination programmes, specifically rotavirus vaccination to the population. The study also revealed that public knowledge and acceptance of rotavirus vaccine is better when the recommendations are delivered by their healthcare practitioner. Moreover, according to WHO, all available rotavirus vaccines are prequalified by WHO with good safety profile. Intussusception, which is an intestinal invagination resulting in obstruction, is the only adverse event associated with rotavirus vaccine and no other side effects has been reported or identified[4]. Thus, the findings of prospective study in USA[31] suggested an increased risk of intussusception associated with monovalent rotavirus vaccination. This finding is in consistent with findings from other countries, for example the study in Mexico showed a significant increase in the risk within 7 days after the first dose of the monovalent vaccine[32]. The study in Brazil revealed a doubling of the risk within 7 days after the administration of the second dose of monovalent rotavirus vaccine[32]. However, the well-documented benefits of rotavirus vaccine need to be considered as countries that included rotavirus vaccine into their NIPs, reported a large decline in rotavirus disease and associated hospitalizations. Thus, the benefits of rotavirus vaccination in infants have been found to outweigh possible small risks of intussusception.

A number of limitations should be taken into account when interpreting findings of this study due to study design and methodology. Firstly, is not possible to establish the temporal direction of the association between the outcomes of interest and the influencing factors in the cross-sectional study. Secondly, this study does not assess knowledge of parents regarding childhood vaccination and therefore we only can assume or hypothesize the nature of findings. Thus, there may be a need in another in-depth research with larger sample size. Lastly, this study was not designed to identify which measures might be taken to address the problems in it. A strength of this study is the use of a previously validated survey instrument (the PACV) to determine vaccine hesitancy in parents.

CONCLUSION

In conclusion, majority of the participants (78,7%) had positive attitudes towards childhood vaccination, while 21,3% of them had vaccine hesitancy in Bishkek city. This study found that the differences in childhood and rotavirus vaccine hesitancy by ethnicity and educational background of the participants. The findings of this study report that most of the parents were non hesitant in numerous areas, such as intention to vaccinate their children with rotavirus vaccine, trust in information about vaccines. Parents expressed their concerns regarding the safety of vaccine shots in general, efficacy of rotavirus vaccine and potential side effects of rotavirus vaccine.

ETHICAL CONSIDERATIONS

The approval for this study was granted by Social and Human Sciences Ethics Committee Ankara Yildirim Beyazit University (AYBU).

AUTHOR CONTRIBUTIONS: Study design, data collection, original draft preparation, formal analysis Iana Kirillova; Contribution to study design, review and editing the draft Salih Mollahaliloğlu, Nimetcan Mehmet Orhun and Abed Ali. All authors have read and agreed to the published version of the manuscript.

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