

# HEALTH LITERACY STATE OF PARENTS WHO REFUSE VACCINES IN THE IMMUNIZATION SCHEDULE OF THEIR CHILDREN

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## ABSTRACT

**Aim:** In this study we aimed to investigate the health literacy state of parents who refused one or more vaccines in the immunization schedule of their children for the first 24 months, and other situations that could be associated with vaccine rejection.

**Methods:** All of the families who were registered to the Bağlaraltı Family Health center between January 2020 – April 2020 and who refused one or more vaccines in the immunization schedule of their children for the first 24 months were included in this study. The participants were divided into two groups as those with vaccine rejection and those without vaccine rejection. A sociodemographic data form and the European Health Literacy Survey short version were applied using a face-to-face technique.

**Results:** In the study that we performed with 44 families with vaccine rejection and 44 families without vaccine rejection, statistically no difference was observed between the two groups in terms of educational status, income level, smoking and alcohol usage. Limited-inadequate health literacy was associated with vaccine rejection ( $p=0.16$ ). In the group with vaccine rejection, the rate of mothers who refused the tetanus vaccine during their pregnancy and the OGTT test was higher than in the control group ( $p<0.001$ ). The number of primary care applications was lower in the group with vaccine rejection ( $p<0.001$ ) and it was detected that these families applied less to health care institutions ( $p=0.022$ ). 59.09% of the parents indicated that they refused to get their children vaccinated because they found it harmful and 56.82% of them were influenced by others who refused vaccination.

**Conclusions:** Low health literacy had a negative effect on decisions of families for vaccination of their children. Vaccine rejection is at the same time associated with less usage of the health care system. Family physicians must reach out to these families and give them the necessary training.

**Keywords:** Childhood immunization, health literacy, primary care, vaccine rejection

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## Introduction

Vaccine rejection dates back to the 1800s. In 1853, the English government made it compulsory for the public to be vaccinated against smallpox during the epidemic without a comprehensive enlightenment force of circumstances and individuals who refused to be vaccinated were subject to harsh penalties including prison. These practices were met with great reaction by the people and forced imposition caused rejection due to its nature (1). The main reason of rejections in those days was the belief that diseases were God's punishments and trying to treat them meant standing up to God (2). In 1885, tens of thousands of people took to the streets of England in opposition to compulsory smallpox vaccinations. Following this well-attended act, the English government decided to sustain smallpox vaccination program but by revoking the punishments against the ones who refused vaccination, thus laid the foundations of conscientious objection (3).

In 1907, the first Anti-Vaccination Conference was held in the United States of America and in 1908 The Anti-Vaccination League of America was created in Philadelphia. In the same years, a resistance movement against vaccines started in Brazil (2).

Thanks to the increase in awareness with developing age and information and government policies, anti-vaccination resistance was broken, however a new increase has been observed in anti-vaccination discourse within the last 2 decades. For this reason, WHO founded the Vaccine Hesitancy Working Group in March, 2012 (4).

WHO groups the factors hindering vaccination under three main topics. These are; contextual reasons, individual and group effects, effects regarding vaccines and vaccination (4). These reasons must be well understood to prevent vaccine rejection and the

solution created must resolve the factors which cause one or more vaccine rejection with a multifactorial approach.

Vaccine rejection cases, which were very few in our country in the beginning, have showed a sharp increase with the winning of a lawsuit about "taking consent from the parent for vaccination" in 2015 and with frequent media coverage of anti-vaccination discourses. Whereas number of families who do not want to get their children vaccinated was 183 in 2011, this figure increased to 980 in 2013, 5 thousand 400 in 2015 and 12 thousand in 2016, and number of cases about vaccine rejection reached the level of 23 thousand as of 2018 (5).

In this study, we aim to investigate the health literacy states of the parents who refuse one or more vaccines in the immunization schedule of their children for the first 24 months and other situations which could be associated with vaccine rejection.

## METHODS

This study was conducted on families registered to University of Health Sciences, Bursa Yuksek Ihtisas Training and Research Hospital, Bağlaraltı Family Health Center between January 2020 – April 2020 and who refused one or more vaccines in the immunization schedule of their children for the first 24 months applied within the framework of the Expanded National Program on Immunization. Children without vaccination rejection and with the closest date of birth were chosen as the control group.

The dissertation named "Vaccine Rejection in the Population Registered to Bağlaraltı Family Health Center and Related Factors" was approved by the Clinical Research Ethics Committee of Bursa Yuksek Ihtisas Training and Research Hospital, University of

Health Sciences, with the resolution and approval dated 13.11.2019, no 2011-KAEK-25 2019/11-17.

Socio-demographic data form, HLS-EU Short Version European Health Literacy Survey and a form of questions interrogating the patient's past medical decisions and his/her reason of vaccine rejection were used in the research.

European Health Literacy Survey Short Version (HLS-EU Q16): This survey was developed by European Health Literacy Consortium within the context of European Health Literacy Research between 2009-2012 (6). Validity-reliability study to determine HL level in Turkey was conducted in 2018 by Emiral et al. and it consisted of 16 questions which can be answered by the participants as "very difficult, difficult, easy, very easy and I don't know" (7). This survey is based on the principle of the individual's self-perception of how "easy" or how "difficult" the behavior is indicated in each question. In our study, the questions were read to the participants one by one and they were asked to choose the most appropriate answer for themselves. In the scoring process, choices of very difficult and difficult were scored as 0 and choices of easy and very easy were scored as 1. Participants who ticked the choice "I don't know" in 3 or more questions were left out of assessment. Total score was obtained by adding the scores of all questions. Score (0-8) was assessed as inadequate HL, score (9-12) was assessed as problematic HL and score (12-16) was assessed as sufficient HL.

In accordance with our observations in vaccine rejection process, a short form of five questions which interrogate the reasons of vaccine rejection and circumstances that can be associated with the parents' vaccine rejection attitude was used. This form consists of questions interrogating whether the individuals who refuse vaccines have had Td and oral glucose tolerance test (OGTT) during their pregnancy, as well

as their reason of vaccine rejection. In this form, the patient can make appropriate choices for herself/himself and the questions interrogate whether they refuse all vaccines or some specific ones and also vaccination status of their other children, if exist.

### Statistical Analysis

Conformity of the variables to normal distribution was analyzed with Shapiro Wilk test. In case of conformity to normal distribution, continuous variables are expressed with mean  $\pm$  standard deviation, in case non-conformity they are expressed with median (minimum: maximum) values. Categorical variables are expressed with n (%). In inter-group comparisons of categorical variables, Pearson chi-square, Fisher's exact chi-square test or Fisher Freeman-Halton tests were used. Mann Whitney U test and Student's T test were used in comparison of two groups according to the normality test result. In case of non-conformity with normal distribution, it was expressed with median, IQR, min, max. SPSS (IBM Corp. Released 2012. IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp.) program was used for statistical analysis and  $p < 0.05$  was statistically accepted significant.

### RESULTS

In the study which was conducted on 44 participants with vaccine rejection and 44 without vaccine rejection, no difference was detected between the two groups in terms of gender, income level, parental marital status, maternal education, profession, alcohol usage and smoking. Paternal education was higher in the group with vaccine rejection (Table1).

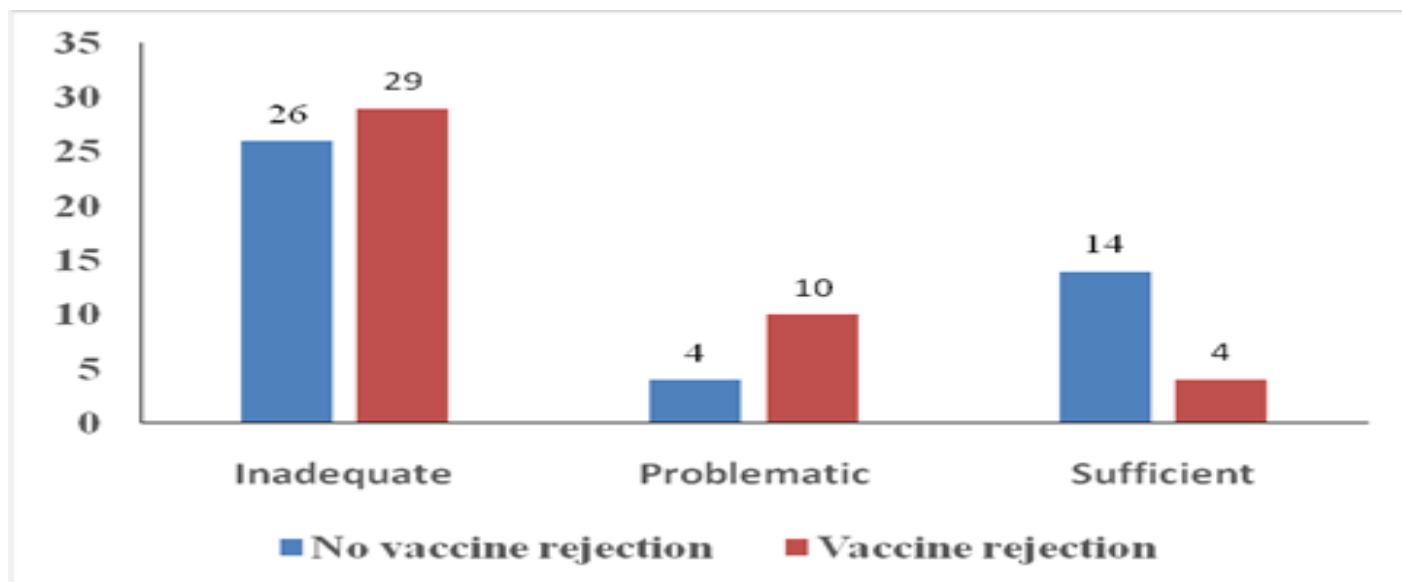
**Table1. Comparison of the general characteristics of the participants and parents**

|                                | <b>Vaccine Rejection (n=44)</b> | <b>No Vaccine Rejection (n=44)</b> | <b>p value</b>     |
|--------------------------------|---------------------------------|------------------------------------|--------------------|
| <b>Child age (months)</b>      | 31.73 (min:23-max:45)           | 31.45 (min:22-max:43)              | 0.917*             |
| <b>Gender</b>                  | Female: 72.7% (n=32)            | Female: 81.8% (n=36)               | 0.309 <sup>+</sup> |
|                                | Male: 27.3% (n=12)              | Male: 18.2% (n=8)                  |                    |
| <b>Income Level</b>            | Low: 0% (n=0)                   | Low: 9.1% (n=4)                    | 0.179 <sup>^</sup> |
|                                | Medium: 68.2% (n=30)            | Medium: 63.6% (n=28)               |                    |
|                                | High: 31.8% (n=14)              | High: 27.3% (n=12)                 |                    |
| <b>Parental marital status</b> | Married: 100% (n=44)            | Married: 97.7% (n=43)              | 0.494 <sup>^</sup> |
|                                | Divorced: 0% (n=0)              | Divorced: 2.3% (n=1)               |                    |
| <b>Education Mother</b>        |                                 |                                    |                    |
| Illiterate                     | 0% (n=0)                        | 2.3% (n=1)                         | 0.167 <sup>^</sup> |
| Primary School                 | 6.8% (n=3)                      | 9.1% (n=4)                         |                    |
| Secondary School               | 34.1% (n=15)                    | 25% (n=11)                         |                    |
| High School                    | 13.6% (n=6)                     | 31.8% (n=14)                       |                    |
| University                     | 45.5% (n=20)                    | 31.8% (n=14)                       |                    |
| <b>Education Father</b>        |                                 |                                    |                    |
| Illiterate                     | 0% (n=0)                        | 0% (n=0)                           | 0.050 <sup>^</sup> |
| Primary School                 | 2.3% (n=1)                      | 9.1% (n=4)                         |                    |
| Secondary School               | 9.1% (n=4)                      | 22.7% (n=10)                       |                    |
| High School                    | 34.1% (n=15)                    | 38.6% (n=17)                       |                    |
| University                     | 54.5% (n=24)                    | 29.5% (n=13)                       |                    |
| <b>Profession Mother</b>       |                                 |                                    |                    |
| Staff                          | 11.4% (n=5)                     | 4.5% (n=2)                         | 0.436 <sup>^</sup> |
| Worker                         | 0% (n=0)                        | 4.5% (n=2)                         |                    |
| Other                          | 13.6% (n=6)                     | 13.6% (n=6)                        |                    |
| Not Working                    | 75% (n=33)                      | 77.3% (n=34)                       |                    |
| <b>Profession Father</b>       |                                 |                                    |                    |
| Staff                          | 11.4% (n=5)                     | 4.5% (n=2)                         | 0.436 <sup>^</sup> |
| Worker                         | 0% (n=0)                        | 4.5% (n=2)                         |                    |
| Other                          | 13.6% (n=6)                     | 13.6% (n=6)                        |                    |
| Not Working                    | 75% (n=33)                      | 77.3% (n=34)                       |                    |
|                                |                                 |                                    |                    |

| <b>Smoking</b> |              |              |                    |
|----------------|--------------|--------------|--------------------|
| Mother         |              |              |                    |
| Yes            | 11.4% (n=5)  | 18.2% (n=8)  | 0.772 <sup>^</sup> |
| Quitted        | 2.3% (n=1)   | 2.3% (n=1)   |                    |
| Father         |              |              |                    |
| Yes            | 29.5% (n=13) | 50% (n=22)   | 0.122 <sup>^</sup> |
| Quitted        | 4.5% (n=2)   | 6.8% (n=3)   |                    |
| <b>Alcohol</b> |              |              |                    |
| Mother         |              |              |                    |
| Always         | 0%           | 0%           | -                  |
| Sometimes      | 0%           | 0%           |                    |
| Never          | 100% (n=44)  | 100% (n=44)  |                    |
| Father         |              |              |                    |
| Always         | 0%           | 0%           | 0.241 <sup>^</sup> |
| Sometimes      | 0%           | 6.8% (n=3)   |                    |
| Never          | 100% (n=44)  | 93.2% (n=41) |                    |

\*Mann Whitney U test, <sup>+</sup>Chi-square analysis, <sup>^</sup>Fisher-Freeman-Halton test

Limited-inadequate health literacy is associated with vaccine rejection (p=0.16) (Figure1).



**Figure1.** Health literacy and vaccine rejection

Td and OGTT rates of the participants during pregnancy are shown in Table 2. It was detected that rate of tetanus vaccination and oral glucose tolerance

test rejections during pregnancy was higher in the group with vaccine rejection, with respect to the control group (p<0.001).

**Table2. Td vaccination and OGTT rates of the participants during their pregnancies**

|                             |                       | Vaccine Rejection |            |        |            | p value |
|-----------------------------|-----------------------|-------------------|------------|--------|------------|---------|
|                             |                       | No                |            | Yes    |            |         |
|                             |                       | Number            | Percentage | Number | Percentage |         |
| Td vaccination in pregnancy | No                    | 3                 | 6.82%      | 23     | 52.27%     | <0.001  |
|                             | Yes                   | 39                | 88.64%     | 18     | 40.91%     |         |
|                             | Vaccinated previously | 2                 | 4.55%      | 3      | 6.82%      |         |
| OGTT in pregnancy           | No                    | 18                | 40.91%     | 38     | 86.36%     | <0.001  |
|                             | Yes                   | 26                | 59.09%     | 6      | 13.64%     |         |

<sup>+</sup> Fisher-Freeman-Halton test

Vaccination status of other children of vaccine refusing parents is shown in Table 3. 19 of 44 vaccine rejection

cases didn't have other children. Other children were not vaccinated in 52% of the remaining 25 cases.

**Table3. Vaccination Status of the Other Children of the Parents who Refuse Vaccines**

|                                      |                   | Number | Percentage |
|--------------------------------------|-------------------|--------|------------|
| Vaccination status of other children | No                | 13     | 29.55%     |
|                                      | Yes               | 10     | 22.73%     |
|                                      | Partly            | 2      | 4.55%      |
|                                      | No other children | 19     | 43.18%     |

Number of health institution visits of the participants within last 1 year is given in Table 4. Number of primary care application of the group with vaccine rejection was lower ( $p < 0.001$ ) and also they visited less health institutions ( $p = 0.022$ ).

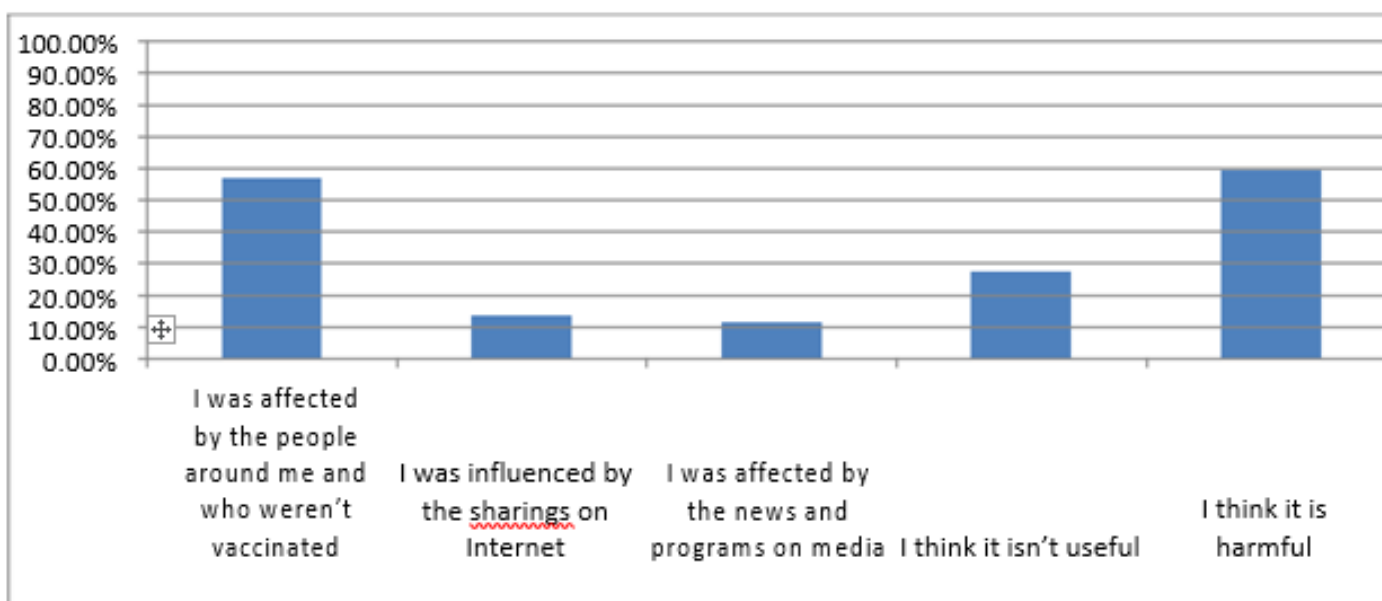
**Table4. Number of the participants’ visit to health institutions in the last 1 year and vaccine rejection**

|  | Vaccine Rejection |      |      |       |        |      |      |       | p value*         |
|--|-------------------|------|------|-------|--------|------|------|-------|------------------|
|  | No                |      |      |       | Yes    |      |      |       |                  |
|  | Median            | IQR  | Min. | Max.  | Median | IQR  | Min. | Max.  |                  |
| Number of applications to primary care | 10.00             | 8.00 | 1.00 | 24.00 | 4.00   | 6.00 | .00  | 22.00 | <b>&lt;0,001</b> |
| Number of application hospital         | 7.00              | 8.00 | 1.00 | 38.00 | 5.00   | 6.00 | .00  | 14.00 | <b>0.022</b>     |

\*Mann Whitney U test

As vaccine rejection reasons, 59.09% of the participants indicated that they found it harmful and

56.82% of them were influenced by other people around them who didn't get vaccinated (Figure2).



**Figure2.** Distribution of vaccine rejection reasons of the parents who refuse vaccination

**DISCUSSION**

Limited-inadequate health literacy is associated with vaccine rejection. Rate of tetanus vaccination and oral glucose tolerance test rejections during pregnancy was

higher in the group with vaccine rejection with respect to the control group. Number of primary care applications of the group with vaccine rejection was lower and also they visited less health institutions.

59.09% of the participants indicated that they found it harmful and 56.82% of them were influenced by other people around them who didn't get vaccinated.

As a result of our study, education level of the fathers was higher in the group with vaccine rejection. This result, contrary to what is believed, must be considered in the sense of tendency to vaccine rejection of educated families besides low education level. Similarly, in another study, it was detected that families with high education level forget their children's vaccination appointment dates in higher rates (8). In another study, it was shown that there was a close relationship between vaccination rates of the children and mother's education level and vaccination rates increase as the mother's education level increases (9). In a study conducted in USA it was shown that high educational level of the mother positively affects vaccination status (10).

One of the significant findings of our study was that mothers who refuse vaccination of their children had lower rates of Td vaccination and OGTT during their pregnancies with respect to the second group. In our study, whereas rate of avoiding Td vaccination during pregnancy of the mothers refusing vaccination for their children was 52.27%, this rate was 6.82% in the second group. Such a big difference is thought-provoking and frightening for maternal Td which has reached the elimination point. In a study conducted by Turan et al. in 2019, Td application rate during pregnancy was found close to the control group of our study, as 77.9% (11). In a study performed by Maral et al. in 2001, Td rate of the pregnant women was detected as 46.7% (12). In another study performed by Sağsöz et al. in 2002, the same rate was found as 54.8% (13). When all these rates were analyzed, it was observed that unfortunately vaccination rates of the group with vaccine rejection were at the levels of the early 2000s. When it is considered that vaccination

records in the early 2000s weren't kept as accurate as today, it can be concluded that the picture is worse today.

We faced a similar situation with Td when the OGTT rates of our participants were analyzed. Whereas rate of avoiding OGTT during pregnancy of the mothers refusing vaccination for their children was 86.36%, this rate was 40.91% in the control group. Prevalence of gestational diabetes in which OGTT is used for diagnosis is between 3-8% in our country (14). When the risk that can be posed by GDM both for the baby and the mother is considered, it is obvious how important OGTT is for early diagnosis of the disease, if exists. However, unfortunately as in Td, OGTT rejection has also reached critical aspects in patients with vaccine rejection. In a previous study, similar with the control group of our study, OGTT avoidance rate was detected as 34.20%. This rate was 14% according to another study (15). These different rates in the literature can be associated with socio-economic features of the regions where the studies were conducted and size of the study population.

We asked the group with vaccine rejection why they refused it and we found out that 59.09% of the participants found it harmful, 27.27% of them thought it was not useful, 11.36% of them were affected by the news and programs on media, 13.64% of them were influenced by the sharings on internet and 56.82% of them were affected by the people around them who didn't get vaccinated. Another noteworthy finding was that 57.6% of the group who found the vaccine harmful was at the same time influenced by people around them. In another study with similar rates as our research, 63.9% of the participants didn't find the vaccines safe and 57.6% of them didn't find the vaccines useful, 21.9% of them were influenced by the negative news on media and 15.8% of them followed anti-vaccine groups (8). These rates support



our study and their results have higher rates than our study. This situation can be associated with the study's region, socio-economical level and size of the population. In a study conducted in 2019 the most common vaccine rejection reasons were respectively; distrust to the vaccine content (44.0%) and possible side effects of the vaccines (37.4%) (16).

According to the results of our study, majority of our participants have a thought of rejection not only for a specific vaccine but for all types of vaccines. Only 4.55% of the participants indicated that they weren't against BCG vaccine, but they refuse all other vaccines except BCG. When we analyze the literature, in a study conducted by Luthy et al. it was detected that hepatitis B and chickenpox were the mostly refused vaccines because their risks of infectiousness were perceived to be low (17). According to our study, the families who didn't refuse BCG vaccine had met tuberculosis disease in their immediate surroundings before and they had concerns about this disease.

We detected in our study that the parents who refuse vaccination applied less to health institutions for their children. The difference in application to health institutions was significantly much higher in primary care health institutions where immunization program is widely conducted in our country. The occurrence of this situation can be related with the feeling of distrust towards the health institution where vaccination is performed and the related physician or feeling of avoidance from being questioned about not being vaccinated.

Limited-inadequate health literacy is associated with vaccine rejection. Health literacy is associated with positive health behaviors (18). Individuals with high health literacy use the health system more effectively. They participate in screening programs in higher rates. Health literacy positively effects the patients' compliance with medication (19). In this study, effect

of health literacy of the families on their decision of the vaccination of their children was exhibited.

As a conclusion, low health literacy negatively effects the families' vaccination decision on their children. Vaccine rejection is also associated with less usage of the health system. Family physicians must reach out these families and give them the necessary trainings.

### **CONFLICT OF INTEREST**

The authors declare that there is no conflict of interest.

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