



## A STUDY OF MISINFORMATION EXPOSURE OF COVID-19 VACCINE AND THE WILLINGNESS TO BE VACCINATED IN TANGERANG SELATAN CITY, INDONESIA

### *Studi Paparan Misinformasi Vaksin Covid-19 Dan Keinginan Untuk Divaksinasi Di Kota Tangerang Selatan, Indonesia*

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#### **Abstract**

**Latar Belakang:** Vaksin COVID-19 sangat penting dalam upaya mengurangi penyebaran penularan. Namun, penolakan terhadap vaksin yang terjadi mungkin disebabkan oleh beredarnya misinformasi tentang vaksin COVID-19 melalui media sosial.

**Tujuan:** Penelitian ini bertujuan untuk mengkaji paparan misinformasi vaksin COVID-19 dan faktor-faktor yang terkait serta mengidentifikasi hubungan antara paparan misinformasi vaksin COVID-19 dengan keinginan untuk divaksinasi.

**Metode:** Studi potong lintang dilakukan pada orang berusia 18-34 tahun di Kota Tangerang Selatan. Dengan menggunakan metode convenience sampling, kami merekrut 227 responden yang mengisi kuesioner secara online melalui google form. Data dianalisis menggunakan uji chi-square, uji Fisher, dan regresi logistik.

**Hasil:** Responden yang tidak memiliki kuota internet cenderung 2,197 kali untuk terpapar misinformasi. Responden yang temannya tidak peduli jika mereka menyebarkan misinformasi memiliki kemungkinan 2.1 kali lebih besar untuk mendapatkan misinformasi. Responden yang memiliki teman yang menyebarkan misinformasi cenderung 1,9 kali lebih besar untuk terpapar misinformasi. Studi ini tidak menemukan hubungan yang signifikan antara paparan misinformasi COVID-19 dan kesediaan untuk divaksinasi.

**Kesimpulan:** Pengaruh teman sebaya terkait paparan misinformasi vaksin COVID-19 sangat penting. Pengembangan model pendidik sebaya sangat penting untuk mendorong kontribusi kaum muda dalam mengakhiri pandemi.

**Kata kunci:** Misinformasi, Vaksin COVID-19, kaum muda, Teman Sebaya, Indonesia

#### **Abstrak**

**Background:** COVID-19 vaccine is important to reduce the spread of transmission. However, the objection occurred might be caused by the circulation of misinformation of COVID-19 vaccine through social media.

**Objective:** This study aimed to assess the misinformation exposure of COVID-19 vaccine and its related factors and to identify the association between misinformation exposure of COVID-19 vaccine and the willingness to be vaccinated.

**Method:** A cross-sectional study was conducted on people age 18-34 years in Tangerang Selatan City. Using convenience sampling, we recruited 227 respondents who filled an online questionnaire through a google form. Data were analyzed using the chi-square test, fisher's exact test, and logistic regression.

**Result:** Respondents who did not have sufficient internet balance were 2.197 more likely to have misinformation exposure. Respondents whose friends were ignorant if they spread misinformation were 2.1 times more likely to get misinformation. Respondents whose friends disseminated misinformation were 1.9 times more likely to get exposed to misinformation of the COVID-19. This study found no significant relationship between misinformation exposure of COVID-19 vaccine and willingness to be vaccinated.

**Conclusion:** Peer influence regarding exposure to COVID-19 vaccine misinformation is very important. Developing a peer educator model is prominent to encourage the role of young people to end the pandemic.

**Keywords:** Misinformation, COVID-19 Vaccine, Young People, Peer, Indonesia

## INTRODUCTION

COVID-19 was declared a pandemic by the World Health Organization (WHO) on March 11, 2020. Since then, people around the world have struggled to stop the spread of the disease by adopting preventive behaviors such as wearing masks, washing hands, and maintaining physical distancing. However, these measures are not enough to reduce the number of cases as special protection, namely vaccination is needed. Several infectious diseases have been successfully eradicated with herd immunity achieved through the vaccination programs, such as polio, measles, pertussis, mumps, tetanus, diphtheria, and rubella<sup>1</sup>. The COVID-19 vaccine is expected to provide immunity to the body so it can minimize the number of people exposed to the SARS-CoV-2 virus and the pandemic will eventually end. However, the implementation of the vaccination program has challenges in terms of acceptance by the community. Vaccines have their own history with many cases of rejection for several reasons<sup>2</sup>.

Research in six European countries about COVID-19 vaccination found that 18.9% of respondents said they were unsure, and 7.2% said they did not want to be vaccinated<sup>3</sup>. In line with European countries, research in Indonesia found that 7.6% of people have refused the COVID-19 vaccine and 27.6% have not yet decided, which means they may accept, refuse or delay the vaccine<sup>4</sup>.

Meanwhile, several studies found that people with characteristic variables such as lower-middle socioeconomic status<sup>4</sup>, women, aged less than 60 years, lower education level, less knowledge about vaccines<sup>3,5</sup>, Muslim, and uninsured<sup>4</sup>, potentially refuse COVID-19 vaccines.

Rejection of vaccines by the public are influenced by problems related to the level of public trust in vaccines, vaccine safety and effectiveness, and vaccine halalness<sup>4</sup>. The pros and cons of these issues can lead to the spread of COVID-19 misinformation in the community.

A study on vaccine criticism found that pro and contra about COVID-19 vaccine information will lead public opinion to be the vaccine opponents<sup>6</sup>. It is known that anti-COVID-19 vaccine groups have used social media as a primary means of information dissemination<sup>7</sup>. A study in India revealed that people have mixed perceptions regarding COVID-19 vaccine and the spread of misinformation would affect people's willingness to get vaccination<sup>8</sup>. In Indonesia, some misinformation about COVID-19 vaccine which was circulated among the community were identified by the government and then it was put on the website in hoax buster section to remind people that the information was inaccurate, for example, the issue of the halalness of the vaccine, vaccine safety and politicization of COVID-19 vaccine by the government<sup>9</sup>.

Misinformation refers to claims or descriptions of inaccurate, manipulated, or partial information intended to mislead others<sup>10</sup>. Misinformation about COVID-19 including COVID-19 vaccine is a global public health threat. In terms of COVID-19 vaccine misinformation, it will lead to an increasing number of vaccine rejections. Exposure to COVID-19 misinformation that continuously occurs in public can cause the negative effect, such as the emergence of doubts about the COVID-19 vaccine<sup>11</sup>.

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A study in the United States found that misinformation through social media can interfere with the handling of the Ebola outbreak and the misinformation phenomenon was getting worse during the outbreak since the level of fear was also getting higher<sup>12</sup>.

To better understand the vaccine refusal, the role of social media is therefore important to be explored<sup>13</sup>. Misinformation circulated during the first three months of COVID-19 outbreak in Indonesia was dominated by social media, which means that social media is still the main source of spreading misinformation compared to other channels<sup>14</sup>. In addition, the role of social media has been noticed before the COVID-19 pandemic in order to understand the vaccine refusal mechanism<sup>13</sup>. Several studies were conducted on the issue of misinformation of COVID-19 and the people's intention to be vaccinated in the UK and USA<sup>15</sup>. However, such studies are limited in Indonesia, particularly studies among young people and young adult. Therefore, there is a need to study vaccine misinformation exposure from social media platforms. This research aimed to assess the exposure of COVID-19 vaccine misinformation and its related factors, and to identify the association between misinformation exposure of COVID-19 vaccine and the willingness of people to be vaccinated.

## **METHODS**

### *Study Design*

This research was a quantitative study using a cross-sectional design in Tangerang Selatan City. The study population were people age 18 to 34 years as this group belongs to active user of social media according to the survey of the technology and information Ministry of Communication and Information Republic of Indonesia<sup>16</sup>. The inclusion criteria of the respondents were as follows: 18 to 34 years old; a resident in Tangerang Selatan City; and active user of social media. The minimum sample size for this study was 204, which was determined by using hypothesis tests for two population proportions.

We used convenience sampling as the sampling technique of this study. Online data collection was conducted using a questionnaire in a google form platform which was accessed through a link shared via social media networks, such as Instagram, Whatsapp, and Facebook during September to October 2020. We had a total of 227 respondents when the data collection was ended. Prior to the online survey, respondents were asked about their willingness to voluntarily participated in the study which was indicated by the informed consent. Once they agree, their willingness was confirmed by pressing the agree button and the next button in the survey questionnaire. The ethical approval of this study was obtained from the Ethical Commission of Faculty of Health Sciences Syarif Hidayatullah State Islamic University Jakarta (Un.01/F.10/KP.01.1/KE.SP/011.08.008/2020).

### *Data collection*

We developed the study questionnaires based on the Theory of Planned Behavior (TPB) and the preliminary study. The self-efficacy variable included in the TPB was adopted and translated as the perceived behavioral control (PBC) variable. This variable might affect the person's intention and behavior<sup>17</sup>. The PBC variable can influence the intention and behavior of a person by considering their internal and external factors<sup>18</sup>. In this study, we considered that internal and external factors can cause people to be exposed to the misinformation of COVID-19 vaccine. On one hand, the internal factors were related to the intention and certain behavior. We included the internal factors such as characteristics of respondents (age, education, gender, and working status), self-efficacy, and attitude in this study. On the other hand, the external factors in this study were related to the perception of respondents, such as other's expectations to avoid misinformation of COVID-19 vaccine, advice to avoid misinformation of COVID-19 vaccine and dissemination of misinformation of COVID-19 vaccine.

The instruments consisted of questions to measure the dependent and independent variables. The dependent variables in this study were misinformation exposure of COVID-19 vaccine and willingness to be vaccinated. Meanwhile, the independent variables were divided into internal and external factors. We measured the independent variables with 10 questions. For the dependent variables, we asked one question regarding the respondent's exposure to misinformation on COVID-19 vaccine and another one question about their willingness to be vaccinated. We provided screenshots of the message of misinformation of COVID-19 vaccine in the questionnaire. We identified the misinformation message based on the preliminary study showed that COVID-19 vaccine misinformation was the most widely circulated in the community during September 2020. The content of the message was related to the issue of halalness and conspiracy of the COVID-19 vaccine. The respondents had to answer the question with yes or no (The Guttman scale). We tested the validity and reliability of the questionnaire with 0.909 *Cronbach Alpha*.

We defined misinformation exposure as any exposure from social media that contains all inaccurate information regarding the COVID-19 vaccine, such as the effectiveness and the conspiracy theory<sup>10,15</sup>. In this paper, we used the term of misinformation exposure to describe the misinformation exposure from social media. The misinformation exposure of COVID-19 vaccine might affect people's willingness to be vaccinated. The focus of this study was limited to the relationship between the misinformation exposure of COVID-19 vaccine and the willingness to be vaccinated without being adjusted for other variables.

#### *Data analysis*

Data were analyzed using univariate and bivariate analysis. The univariate analysis described the frequency distribution of respondent characteristics. The differences between the two groups (COVID-19 misinformation exposure

group versus non-exposure group), including the respondent's characteristics, as well as internal and external factors of misinformation exposure were analyzed using the chi-square test and fisher's exact test. Logistic regression was performed to compute prevalence odds ratios (PORs) to identify the association of misinformation exposure with the respondent's characteristics and COVID-19 misinformation belief. The associations of COVID-19 misinformation exposure with the willingness to get vaccinated were also investigated. In this research, we divided the age groups into young people (18 to 24 years old) and adults (>24 years old) to identify the differences between two groups<sup>19</sup>. Data analysis used SPSS software (version 24; SPSS Inc., Chicago, IL, USA).

#### **RESULT**

A total of 227 completed questionnaires were collected via google form. The proportion of female respondents was higher than males (80.2% vs. 19.8%). Table 1 illustrates that 91.6% of respondents were 18-24 years old and 8.9% of them were more than 24 years old. For educational background, more than 70% of respondents had primary to secondary school (79.7%). Table 1 also indicates that 81.9% of respondents who participated in this study had no working status.

This study highlighted that nearly one-third of the respondents (30.8%) reported having misinformation exposure of COVID-19 vaccine between August to September 2020. It was found that there was a significant association between having an internet quota and misinformation exposure. The respondent who had insufficient internet balance to verify the accuracy of COVID-19 information were 2.197 more likely to get exposed with misinformation than those who had sufficient internet balance (Table 2). Internet accessibility should be followed by having internet balance to be able to verify whether the information is true or false. However, this study revealed that no significant relationship for other assessments of self-efficacy related to

misinformation of COVID-19 vaccine, such as confidence of respondents in their ability to distinguish misinformation and to verify whether the information is true or false so misinformation could be avoided. Our findings also found that the characteristics' respondents had no significant relationship with misinformation of COVID-19 vaccine.

Table 3 shows that respondents who had ignorant friends to spreading misinformation had more chance to get exposure to the misinformation of the COVID-19 vaccine by 2.1 times compared to those whose friends were care about it. This study also highlighted that respondents whose friends disseminated misinformation were 1.9 times more likely to be exposed to misinformation of the COVID-19 vaccine compared to those whose friends did not disseminate the misinformation. The external variables such as advice from family, friends, religious leader, health staff, and government to elude misinformation of COVID-19 vaccine were not associated with the misinformation exposure.

Furthermore, we analyzed the association between misinformation exposure of COVID-19 and the willingness to be vaccinated as described in Table 4. Of the respondents who were exposed to the misinformation of COVID-19, 20% of them wished to have the vaccination, while 24.8% of respondents who did not get the misinformation had no willingness to get vaccinated. We found no significant association between misinformation exposure of COVID-19 vaccine and willingness to be vaccinated.

## DISCUSSION

In this study, the majority of respondents were 18 to 24 years old that classified as young people (10-24 years)<sup>20</sup>. Age group is characterized by having a desire to imitate their social environment including attitudes and behaviors on social media<sup>21</sup>. In addition, young people aged

18-24 is categorized as the millennial generation<sup>22,23</sup>. Millennials are a generation that is known to be facilitated by digital technology such as internet. Internet allows them to easily interact with others through social media as they can observe and imitate various kinds of attitudes and behaviors on a global scale<sup>24</sup>.

Social media is commonly used as communication media in the past decade. The various kind of social media sites has offered accessibility and convenience in getting and spreading information. This opportunity leads the social media users to endanger themselves as well as others<sup>25</sup>. Thus, health literacy, as well as social media health literacy, is crucial. There is a need to encourage the community to use social media appropriately as social media users tend to misuse this channel negatively to prejudice others. The result of the study also implies that providing content that can improve the health literacy of the community should be accessible with a low internet balance, particularly if the target is young people as an active user of social media.

In the present study, nearly one-third of the respondents reported the exposure of misinformation about COVID-19 vaccine during August to September 2020. A previous study found a different prevalence, where around two-thirds of people reported misinformation exposure during the 2020 pandemic<sup>24</sup>. The differences might be possible due to the different issue of misinformation. Our study explored specifically on the misinformation of COVID-19 vaccine while other studies explored general COVID-19 issues. Another possibility might be due to the difference in accessibility to the internet among countries. Our study found that there was a significant association between misinformation exposure and having sufficient internet balance. By having sufficient internet balance, people can have more accessibility to accurate information which scarcely circulated through social media. They also can verify the validity of the information.

COVID-19 misinformation exposure was known to be associated with the misinformation belief<sup>24</sup>, while in this study, misinformation exposure of COVID-19 vaccine was associated with the ignorance of friends whether they disseminate misinformation. If their peers reluctant to be aware of spreading misinformation, people were 2.1 times more likely to get misinformation exposure of COVID-19 vaccine compared to those whose friends were care about it. This implies that young age groups are influenced by their friends in making decisions about their behavior. Another study found that peer influence had a relationship with the behavioral intention to share misinformation of COVID-19 in the social media<sup>26</sup>. It also implies that considering peers is crucial to reduce the risk of young people having misinformation.

To describe social and emotional development of young people, young people are divided into three groups of characteristics, namely early adolescence (10-14 years old), late adolescence (15-19 years old), and young adolescence (20-24 years old)<sup>19</sup>. One of the characteristics of late adolescence group (15-19 years old) is that they are driven to make friends and have a greater reliance on them making popularity among friends as an important issue. Meanwhile, in the young adolescence group, they might have increased their emotional stability, but peer relationships are still an important priority for them.

This study highlighted that respondents whose friends disseminated misinformation have 1.9 times more chance to get exposure to the misinformation of the COVID-19 vaccine compared to groups whose friends did not disseminate misinformation. This study shows that friends are an important element for young people suggesting that peer education model might be possible as an effective strategy. In this pandemic era, learning process that is carried out through online platforms, including social media, is important to use it positively. Peer education

can be done and promoted interactively and interestingly manner through social media platforms, and can be reached out across the regions. Online peer educator can reach wider and save budget that is crucial and could be a great potential for increasing the widespread acceptance of the COVID-19 vaccine in the community.

This study findings show that misinformation exposure of COVID-19 vaccine was not associated with willingness to be vaccinated. A study in Yemen indicated a clear relationship between misinformation and willingness to COVID-19 vaccination<sup>27</sup>. Moreover, another study revealed that misinformation exposure had declined the intention to be vaccinated among people in UK and USA who previously agreed on the COVID-19 vaccine<sup>15</sup>. Inconsistency on these results might occur since friends or peer influence was a related factor among young people. Hence, it is very important to prioritize strategy to reach young people and make them less exposed to misinformation, and increase their willingness to COVID-19 vaccination, such as through peer educators.

Nevertheless, implementing a peer education model need several steps. First, it is important to assess what topics young people need, for example mental health and COVID-19, digital information in the pandemic era, and so on. The topic should contain comprehensive information which is packaged in a simple and youth-friendly way. Self-efficacy should be one of the main topics in the peer educator curricula. In the theory of Health Belief Model, self-efficacy is defined as confidence in one's ability to take action. There are several ways to support the development of self-efficacy in one person, such as providing training and guidance in performing actions, using progressive goal setting, giving verbal reinforcement, and demonstrating desired behavior<sup>28</sup>. Second, peer education should be focused on young people who are active in many activities and leaders in their groups. This group

can be used as an agent of change who can provide education to other teenagers specifically to disseminate the correct information about COVID-19 and the benefits of the COVID-19 vaccine, as well as to actively promote COVID-19 vaccine.

## CONCLUSION

In this study, we found that nearly one-third of respondents reported misinformation exposure about COVID-19 vaccine. This study highlighted that there was significant association between misinformation exposure and three variables (internet balance, misinformation disseminated by friends and ignorant friends). This study also found that misinformation exposure of COVID-19 vaccine was not associated with the willingness to be vaccinated. We concluded that young people need a strategy that is appropriate with their social and emotional development, such as prioritizing the importance of peer relationships.

## RECOMMENDATION

The need for self-recognition among young people is an important aspect that affects them to get exposed to misinformation of COVID-19. Therefore, this paper recommends a peer educator online model through social media platforms which contains topics that fits to young people.

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**TABLES**

**Table 1. Characteristics of the respondents (n=227)**

Characteristics	Description	n (%)
Age (year), Median (IQR)		21 (18-34)
Age group	18-24 years	208 (91.6)
	>24 years	19 (8.4)
Education level	Primary-secondary	181 (79.7)
	Higher than secondary	46 (20.3)
Sex	Female	182 (80.2)
	Male	45 (19.8)
Working status	Not working	186 (81.9)
	Working	41 (18.1)

**Table 2. Association between internal variables and misinformation exposure of COVID-19 vaccine (n = 227)**

Characteristics	Description	Total n	Misinformation exposure of COVID-19 vaccine		POR† (95% CI)	p value
			Yes n (%)	No n (%)		
<i>Internal variables</i>						
<i>Characteristics of respondents</i>						
Age group	18- 24 years	208	64 (30.8)	144 (69.2)	Ref.	1.000
	>24 years old	19	6 (31.6)	13 (68.4)	0.963	
Educational background	Primary- secondary	181	57 (31.5)	124 (68.5)	Ref.	0.807
	Higher than secondary	46	13 (28.3)	33 (71.7)	1.167	
Sex	Female	182	52 (28.6)	130 (71.4)	Ref.	0.191
	Male	45	18 (40.0)	27 (60.0)	0.600	
Working status	Not working	186	59 (31.7)	127 (68.3)	Ref.	0.669
	Working	41	11 (26.8)	30 (73.2)	1.267	

Characteristics	Description	Total <i>n</i>	Misinformation exposure of COVID-19 vaccine		POR† (95% CI)	<i>p</i> value
			Yes <i>n</i> (%)	No <i>n</i> (%)		
<i>Self-efficacy related to misinformation of COVID-19</i>						
Confidence with his/her own ability to distinguish misinformation	No	34	10 (29.4)	24 (70.6)	Ref.	1.000
	Yes	193	60 (31.1)	133 (68.9)	0.924	
Confidence with his/her own ability to verify the misinformation	No	32	12 (37.5)	20 (62.5)	Ref.	0.500
	Yes	195	137 (70.3)	58 (29.7)	1.417	
Know the official sites related to COVID-19 information	No	22	6 (27.3)	16 (72.7)	Ref.	0.890
	Yes	205	64 (31.2)	141 (68.8)	0.826	
Confidence with his/her own ability to avoid misinformation	No	23	7 (30.4)	16 (69.6)	Ref.	1.000
	Yes	204	63 (30.9)	141 (69.1)	0.979	
Ability to access the official government website	No	69	24 (34.8)	45 (65.2)	Ref.	0.487
	Yes	158	46 (29.1)	112 (70.9)	1.299	
Having internet balance to verify the misinformation	No	37	17 (45.9)	20 (54.1)	Ref.	0.048*
	Yes	190	53 (27.9)	137 (72.1)	2.197	

. †*POR*: prevalence odds ratio, 95% *CI* confidence interval, *Ref*: reference

. \**p*-value < 0.05

**Table 3. Association between external variables and misinformation exposure of COVID-19 vaccine (n = 227)**

Characteristics	Description	Total n	Misinformation exposure of COVID-19 vaccine		POR† (95% CI)	p value
			Yes n (%)	No n (%)		
<i>External variables</i>						
<i>External expectation to avoid misinformation of COVID-19</i>						
Family's expectation	No	33	12 (36.4)	21 (63.6)	Ref.	0.589
	Yes	194	58 (29.9)	136 (70.1)	1.340	
Friends' expectation	No	25	10 (40.0)	15 (60.0)	Ref.	0.411
	Yes	202	60 (29.7)	142 (70.3)	1.578	
Religious leader expectation	No	27	6 (22.2)	21 (77.8)	Ref.	0.418
	Yes	200	64 (32.0)	136 (68.0)	0.607	
<i>Following advice to avoid misinformation of COVID-19</i>						
Family's advice	No	29	6 (20.7)	23 (79.3)	Ref.	0.293
	Yes	198	64 (32.3)	134 (67.7)	0.546	
Friends' advice	No	26	9 (34.6)	17 (65.4)	Ref.	0.828
	Yes	201	61 (30.3)	140 (69.7)	1.215	
Religious leader advice	No	29	10 (34.5)	19 (65.5)	Ref.	0.810
	Yes	198	60 (30.3)	138 (69.7)	1.211	
Government	No	31	8 (25.8)	23 (74.2)	Ref.	0.657
	Yes	196	62 (31.6)	134 (68.4)	0.752	
Health staff advice	No	20	7 (35.0)	13 (65.0)	Ref.	0.866
	Yes	207	63 (30.4)	144 (69.6)	1.231	

Characteristics	Description	Total <i>n</i>	Misinformation exposure of COVID-19 vaccine		POR† (95% CI)	<i>p</i> value
			Yes <i>n</i> (%)	No <i>n</i> (%)		
<i>Dissemination of misinformation of COVID-19</i>						
Misinformation was disseminated by friends	No	74	30 (40.5)	44 (59.5)	Ref.	0.041*
	Yes	153	40 (26.1)	113 (73.9)	1.926	
Friends' ignorance if he/she disseminates misinformation	No	55	24 (43.6)	31 (56.4)	Ref.	0.028*
	Yes	172	46 (26.7)	126 (73.3)	2.121	

†*POR*: prevalence odds ratio, 95% *CI* confidence interval, *Ref*: reference

\**p*-value < 0.05

**Table 4. Association between misinformation exposure of COVID-19 vaccine and willingness to be vaccinated (*n* = 227)**

Characteristics	Description	Total <i>n</i>	Willingness to be vaccinated		POR† (95% CI)	<i>p</i> value
			No <i>n</i> (%)	Yes <i>n</i> (%)		
Misinformation exposure of COVID-19 vaccine	Yes	70	14 (20.0)	56 (80.0)	Ref.	0.531
	No	157	39 (24.8)	118 (75.2)	0.756	

†*POR*: prevalence odds ratio, 95% *CI* confidence interval, *Ref*: reference

\**p*-value < 0.05