Factors Influence the Knowledge, Attitudes, and Behavior of Community about COVID-19 Vaccine in Medan City, Indonesia

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Abstract

BACKGROUND: COVID-19 has been pandemic and causes death worldwide. 905 people died in the capital of North Sumatra, Medan City, Indonesia until November 2021. Medan city was once a red zone including Medan Denai District, the first dose of vaccination coverage was still 60% (1,476,248 people) and the second dose was still 45.8% (1,116,271 people) in November 2021. Public awareness of the importance of COVID-19 vaccination is needed to succeed in vaccination programs and reduce the rate of COVID-19 cases. Nevertheless, research related to public awareness about COVID-19 vaccination was still little done in Medan city.

AIM: In this study, we analyzed the factors that influence the knowledge, attitudes, and behavior of community about COVID-19 vaccine in Medan Denai District of Medan City.

METHODS: This study was a cross-sectional study with a validated questionnaire approach in 100 respondents. Data collection were conducted from September to November 2021. The questionnaire consisted of 36 questions to assess the level of knowledge, attitudes, and behavior. Statistical analysis was done using IBM Statistical Package for the Social Sciences v.26, $p < 0.05$ was statistically significant.

RESULTS: Knowledge level is sufficient by 50%, good attitude by 99%, good behavior by 82%, the majority of respondents were in the age range of 17–25 years (75%), women (58%), high school education level (63%), jobless (42%), low income (62%), and had a religion (100%). More than 80% of respondents knew the benefits of the vaccine, how the vaccine worked, vaccine brands available in Indonesia, 76% had been vaccinated and 97% agreed to be vaccinated. We found a relation between knowledge with community behavior, education level, and vaccination history with knowledge, religion with community attitudes, and COVID-19 vaccination history with community behavior ($p < 0.05$).

CONCLUSIONS: Respondents had sufficient knowledge, good attitudes and good behavior related to the COVID-19 vaccine. The level of education, religion, and COVID-19 vaccination history affected the knowledge, attitudes, and behavior of people about the COVID-19 vaccine in Medan Denai District, Medan city, Indonesia.

Introduction

On January 30, 2020, the WHO declared that the coronavirus (SARS-CoV-2) outbreak was a public health emergency and became an international concern due to the increasing number of confirmed cases, not only in China but in other countries [1]. SARS-CoV-2 is a new type of virus that has never been found in humans before, and the animals that transmit it are not yet known [2]. The SARS-CoV-2 virus is a round-shaped virus with spike (S) proteins that protrude from the surface of virus particles (virions) and have a single-chain RNA-shaped genetic material [3]. COVID-19 infection can cause mild, moderate, or severe symptoms with the main clinical manifestations being fever (temperature > 38°C), cough, and shortness of breath [4].

Cases of death and the addition of positively confirmed cases in the world have increased, in November 2021 there were 253 million positive confirmed cases and the number of deaths reached 5.09 million people [5]. In Indonesia, the development of daily cases of COVID-19 in November 2021 showed that death cases reached 143,644 and total cases reached 4,250,516 people and in North Sumatra, the number of positive cases reached 105,868 and the number of deaths reached 2887 people [6]. In Medan city as of November 14, 2021, the number of positive cases reached 48,152 and the number of deaths reached 905 people [7].

The target of vaccination in Indonesia is 181,554,465 population. As of November 14, 2021, the number of people who have received the first dose of the vaccine is 129,710,190 people and the second dose of the vaccine is 83,418,086 people [8]. Medan city was

once a red zone, the first dose of vaccination coverage was still 60% (1,476,248 people) and the second dose was still 45.8% (1,116,271 people) in November 2021. Medan Denai district located in Medan City is included in the red zone [9].

The previous surveys showed that 658 respondents were known to be willing to receive the government-provided COVID-19 vaccine, and 8% of them refused to accept it. The remaining 274 people doubted the government's plan to distribute the COVID-19 vaccine. Respondents expressed concern about the safety and effectiveness of vaccines, expressed distrust of vaccines, and question the level of vaccine validity [10]. Other studies also mention that factors that affect people's willingness to receive vaccinations are factors of age, education level, occupation, marital status, religion, and ethnicity. The protective determinant of people's willingness to receive COVID-19 vaccination is age and religion [11]. The previous studies are still very limited related to the analysis of the level of knowledge, attitudes, and behavior of the community about the COVID-19 vaccine and the factors that affect these three things, especially in the city of Medan. The level of knowledge, attitude, and good behavior about the COVID-19 vaccine is certainly an important factor to succeed COVID-19 vaccination activities and becomes a parameter to assess the success of education and health promotion programs conducted by the government [12].

Methods

Study design

This study is an observational analytical study with a cross-sectional approach. The sampling method used the Slovin formula in 148,438 population in Medan Denai district so that 100 respondents were obtained. The survey was conducted from September to November 2021. Data collection was done by sending questionnaires in the form of Google Forms in the Medan Denai subdistrict community. The questionnaire was validated using the Univariate correlation validation test (Pearson) and the Croanbach Alpha reliability test.

The questionnaire consisted of respondents' characteristic data, 36 questions included 16 questions to assess the level of knowledge, 10 questions to assess attitudes, and 10 questions to assess behavior. The allotted time is 30 min and the data is automatically stored in the database and kept confidential. This research was conducted after approval from the ethics committee of the University of North Sumatra No.754/KEP/USU/2021.

Analyses

Data were analyzed using a statistical package for social sciences software v.26.0. Data on respondents'

characteristics, levels of knowledge, attitudes, and behaviors are presented in the form of n (%). The relationship between respondents' characteristics and levels of knowledge, attitudes, and behavior was analyzed using the Chi-Square test, Fischer Test, Kolmogorov-Smirnov test, and Kruskal-Wallis test. p < 0.05 was considered statistically significant.

Results

Demographic characteristics

The majority of respondents to the study had an age range of 17–25 (75%), female (58%), jobless (42%), high school education (63%), Protestant Christians (81%), low income (62%), had no history of exposure to COVID-19 (81%), had no family history of exposure to COVID-19 (72%), had a personal and family history of COVID-19 vaccination (76%) and (87%), and was willing to be vaccinated (97%). The characteristics of respondents are shown in Table 1:

Table 1: Demographic characteristics of respondents

Subject characteristics	Frequency	Percentage
Age group		
17–25	75	75
26–35	9	9
36–45	7	7
46–55	9	9
Gender		
Man	42	42
Woman	58	58
Last education		
No education	1	1
Junior High School	1	1
Senior High School	63	63
Diploma	6	6
Bachelor	28	28
Graduate	1	1
Profession		
Not Working	42	42
Entrepreneur	14	14
Civil Servants	5	5
Private Employees	9	9
Others	30	30
Religion		
Islamic	11	11
Catholic Christian	8	8
Christian Protestant	81	81
Income		
<1,500,000	62	62
1,500,000–2,500,000	14	14
2,500,000–3,500,000	12	12
>3,500,000	12	12
Personal History of Exposure to COVID-19		
Ever	19	19
Never	81	81
Family History of Exposure to COVID-19		
Ever	28	28
Never	72	72
Personal history of COVID-19 vaccination		
Have been vaccinated	76	76
Not vaccinated	24	24
Family history of COVID-19 vaccination		
Have been vaccinated	87	87
Not vaccinated	13	13
Willingness for the COVID-19 vaccine		
Yes	97	97
No	3	3

Based on the study, we conducted, it was found that the level of good knowledge was 46%, 50% sufficient, 4% deficient, 99% good attitude, 1% sufficient, and good behavior 82%, 18% sufficient (data were not shown).

The relationship between respondents' characteristics and the level of public knowledge about COVID-19 vaccination is shown in Table 2.

From Table 2, it could be seen that the level of knowledge based on age with good categories had the largest percentage of 37% at the age of 17–25 years, women had better knowledge than men as much as 33% versus 13%. Based on education history, respondents who finished high school had good knowledge of 32%. As many as, 40% of Protestant Christians have good knowledge. It was quite surprising also that respondents who had incomes below 1 million five hundred thousand rupiah had good knowledge as well. While for respondents and families of respondents who had never been exposed to COVID-19 had good knowledge that was 37% and 33% compared to respondents and families who had been exposed to COVID-19. Respondents and families of respondents who had been vaccinated, had good knowledge levels of 43% and 42%. All respondents who were willing to vaccinate COVID-19 also had sufficient knowledge about COVID-19 vaccination which was as much as 49%. Respondents' characteristics of age, gender, religion, income, history of exposure to COVID-19 and willingness to vaccinate COVID-19 and occupation did not have a significant association with knowledge level ($p > 0.05$) while education level and personal history of COVID-19 vaccination had a significant association with knowledge level ($p < 0.05$). The respondents' characteristic relationship to knowledge is shown in Table 2:

Table 2: Relationship of respondents characteristics with knowledge level of COVID-19 vaccination

Subject characteristic	Good n (%)	Sufficient n (%)	Deficient n (%)	p-value
Age group				
17–25	37	37	1	0.06[a]
26–35	4	4	1	
36–45	0	6	1	
46–55	5	3	1	
Gender				
Man	13	27	2	0.075[c]
Woman	33	23	2	
Last education				
No education	0	0	1	**0.036[a]**
Junior High School	0	0	1	
Senior High School	32	30	1	
Diploma	4	2	0	
Bachelor	9	18	1	
Graduate	1	0	0	
Profession				
Not Working	21	19	2	0.112[a]
Entrepreneur	3	9	2	
Civil Servants	4	1	0	
Private Employees	5	4	0	
Others	13	17	0	
Religion				
Islamic	3	8	0	0.256[a]
Catholic	3	3	2	
Protestant	40	39	2	
Income				
<1,500,000	32	28	2	0.105[a]
1,500,000–2,500,000	7	6	1	
2,500,000–3,500,000	1	11	0	
> 3,500,000	6	5	1	
Personal History of Exposure to COVID-19				
Ever	9	8	2	1.000[c]
Never	37	42	2	
Family History of Exposure to COVID-19				
Ever	13	14	1	1.000[c]
Never	33	36	3	
Personal History of COVID-19 Vaccination				
Have been vaccinated	43	31	2	**0.002[c]**
Not vaccinated	3	19	2	
Family History of COVID-19 Vaccination				
Have been vaccinated	42	42	3	0.879[c]
Not vaccinated	4	8	1	
Willingness for the COVID-19 vaccine				
Yes	45	49	3	0.953[c]
No	1	1	1	

[a]Kruskal-Wallis test, [c]Kolmogorov-Smirnov test.

Characteristic relationship of respondents with public attitudes about COVID-19 vaccination

The majority of respondents aged 17–25 years had a good attitude regarding the COVID-19 vaccine by 74%. Women had a better attitude than men, which was 58% versus 41%. Respondents who finished high school had a good attitude rate of 62%. Based on the characteristics of religion, Islam, Catholic Christianity, and Protestant Christianity, all showed good attitudes of each religion's total in responding to the COVID-19 vaccination. Respondents with low to high incomes had a good attitude that was 12–61%. Respondents who did not have a history of exposure to COVID-19 had a good attitude rate of 81%. Likewise, respondents who had been vaccinated COVID-19 had a good attitude rate of 76% similar with the attitude of the families of respondents who had vaccinated COVID-19 which was as much as 86%. Good attitude was shown by respondents who were willing to vaccinate COVID-19 as much as 96%. Of all the respondents' characteristics, namely, age, education, income, vaccination history, and exposure to COVID-19 and employment did not have a significant relationship with attitude ($p > 0.05$) while religion had a meaningful relationship to attitude ($p < 0.05$). The respondent's characteristic relationship to attitude is shown in Table 3:

Respondent characteristic relationship with community behavior about COVID-19 vaccination

The majority of respondents aged 17–25 years had good behavior regarding the COVID-19 vaccine by 63%. Women had better knowledge than men at 51% versus 49%. Based on education history, respondents who finished high school had good behavior of 50%, followed by respondents who finished bachelor which was 24%. About 68% of Protestant Christians have good behavior. In addition, respondents who had incomes below 1 million five hundred thousand rupiah had good behavior as well. Meanwhile, for respondents and families of respondents who had never been exposed to COVID-19, they had good behavior, which was 66% and 59% compared to respondents and families who had been exposed to COVID-19. Respondents and families of respondents who had been vaccinated had good knowledge levels of 67% and 74%. All respondents who were willing to vaccinate COVID-19 also had sufficient knowledge about COVID-19 vaccination, which was as much as 81%. The characteristics of respondents namely gender, age, education, income, vaccination

Table 3: Relationship of respondents characteristics with attitudes about COVID-19 vaccination

Subject Characteristics	Good n (%)	Sufficient n (%)	p-value
Age group			
17-25	74	1	0.954[a]
26–35	9	0	
36–45	7	0	
46–55	9	0	
Gender			
Man	41	1	0.420[b]
Woman	58	0	
Last education			
No education	1	0	
Junior High School	1	0	0.989[a]
Senior High School	62	1	
Diploma	6	0	
Bachelor	28	0	
Graduate	1	0	
Profession			
Not Working	41	1	
Entrepreneur	14	0	0.847[a]
Civil Servants	5	0	
Private Employees	9	0	
Others	30	0	
Religion			
Islamic	10	1	**0.018[a]**
Catholic Christian	8	0	
Christian Protestant	81	0	
Income			
< 1,500,000	61	1	
1,500,000–2,500,000	14	0	0.893[a]
2,500,000–3,500,000	12	0	
> 3,500,000	12	0	
Personal History of Exposure to COVID-19			
Ever	18	1	0.190[b]
Never	81	0	
Family History of Exposure to COVID-19			
Ever	27	1	0.280[b]
Never	72	0	
Personal History of COVID-19 Vaccination			
Have been vaccinated	76	0	0.240[b]
Not vaccinated	23	1	
Family History of COVID-19 Vaccination			
Have been vaccinated	86	1	1.000[b]
Not vaccinated	13	0	
Willingness for the COVID-19 vaccine			
Yes	96	1	1.000[b]
No	3	0	

[a]Kruskal Wallis test, [b]Fisher's exact test.

Table 4: Distribution of frequency of questions with the number of participants who answered the most correct of questions about COVID-19 vaccination

No	Question	Category	n (%)
1	People who are most at risk of COVID-19 disease are people who like to travel and use masks only to cover their mouth	Knowledge	97
2	Currently, the world has developed a vaccine for the prevention of COVID-19. Vaccines are made from attenuated viruses or bacteria		80
3	The purpose of vaccines is to increase immunity to a disease and reduce morbidity		94
4	The way vaccines work is by developing immunity by mimicking infections and then producing antibodies		90
5	The brands of COVID-19 vaccines that can be found in Indonesia are Sinovac, Sinopharm, AstraZeneca		88
6	Respondents strongly agreed that to prevent the spread of the coronavirus, a person must wear a mask, keep their distance, and wash their hands	Attitude	93
7	Respondents strongly agree that the COVID-19 vaccine should be safe and effective		90
8	Respondents agreed that if COVID-19 has been vaccinated, a person must implement health protocols		87
9	Respondents agreed that the government requires everyone to be vaccinated for COVID-19		72
10	Respondents strongly agree that the COVID-19 vaccination helps protect family, friends, and the public		84
11	Respondents agreed that if they get a COVID-19 vaccination schedule, then they should prepare themselves and go directly to the COVID-19 vaccination location	Behavior	69
12	Respondents strongly disagreed that it could be free not to use masks again when leaving the house after getting the COVID-19 vaccine		56
13	Respondents did not agree to get and believe information about COVID-19 only from family, close friends and people they trust		51
14	Respondents agreed to provide an explanation of the importance of implementing health protocols for people around those who have been vaccinated against COVID-19		64
15	Respondents agreed to try to find valid information either by going to the health service or reading information from the official government website when getting information on social media that the COVID-19 vaccine can cause paralysis		54

history and exposure to COVID-19 and occupation did not have a significant association with behavior (p > 0.05) while the personal history of the COVID-19 vaccine had a meaningful relationship with respondents behavior regarding the COVID-19 vaccine (p < 0.05). (Data were in Supplementary File)

Distribution of question frequency with the number of participants who answered the most correct of questions about COVID-19 vaccination

From Table 4, it could be seen that more than 90% of respondents have a good understanding of the people most at risk of COVID-19 are people who like to travel and use masks only limited to covering the mouth, the benefits of the COVID-19 vaccine is to increase immunity to a disease and reduce morbidity, and the mechanism of work of the COVID-19 vaccine is to develop immunity by mimicking the infection and then produce antibodies. In addition, 80% of respondents had a good understanding of the content of vaccines that are attenuated viruses or bacteria and the type of Sinovac, Sinopharm, AstraZeneca brand was the COVID-19 vaccine circulating in Indonesia. In addition, 93% of respondents strongly agree that to prevent the spread of the coronavirus, it is mandatory

to wear a mask, keep a distance, and wash their hands. Moreover, 90% of respondents agree that the COVID-19 vaccine should be safe and effective. Respondents pay the most attention in terms of self-preparation and go directly to the COVID-19 vaccination location in accordance with the COVID-19 vaccination schedule which is as much as 69%.

Discussion

In this study, there was a relationship between age and knowledge of the COVID-19 vaccine. The same as with previous studies that stated that age affects a person's cognition and mindset. As a person's gets older, they will develop his catch and mindset, so that the knowledge gained is getting better [13]. Significant relationships were also found at the level of education with knowledge, the higher the level of education, the better the level of knowledge. These results are similar with previous research [13]. The existence of a relationship between education and knowledge is in accordance with

the theory that education is to develop one's personality and ability to understand something [14].

We found no meaningful relationship between work and knowledge level. Previous theories have suggested that work provides experiences that influence knowledge. A person who lives busy outside the home and interacts with many people will have a wider range of knowledge than people who spend more time at home. This situation is because a person has many relationships and has the opportunity to get more information [15]. The absence of a meaningful relationship between work and knowledge suggests that knowledge can be influenced by multifactorial.

There was a significant relationship between the personal history of COVID-19 vaccination and the level of public knowledge with the previous research [13]. These results are in line with the theory that knowledge can be gained from experience. An experience is an event that someone has experienced in the past. In general, the more experience a person has, the more knowledge he or she acquires [14]. The existence of a meaningful relationship between the willingness of vaccination and the level of public knowledge is also same with previous research [16]. This is because good knowledge can affect a person's factors such as education level, occupation, age, interests, experiences, environmental culture and information [14].

In this study, gender, religion, and income had no association with knowledge. These results do not correspond to the theory that these three factors are closely related to knowledge [17]. The absence of a significant relationship between gender, religion and income is due to knowledge not only gained from the level of education received, but also supported by information received from mass media, newspapers, magazines, the internet, and television. Motivation also affects a person's knowledge, the presence of curiosity will encourage a person to look for sources of information [18].

Related to community attitudes about the COVID-19 vaccine, there was a significant relationship only between religion and community attitudes in Medan Denai District about COVID-19 vaccination. This is in accordance with the theory explained attitudes can be influenced by educational institutions as well as religious institutions [19]. The characteristics of the other respondents did not have a meaningful relationship to attitudes. There was no relation between age and attitude according to previous studies [20]. The absence of a significant association between sex and attitudes about COVID-19 vaccination is in line with previous research showing that there is no relationship between sex and attitudes toward casual sex [21]. The absence of a significant association between education and attitudes about COVID-19 vaccination was in line with previous research showing that there was no relationship between education and maternal attitudes (p = 1000) about MR vaccination [22]. This was not in accordance with the theory that education is one of the components forming attitudes [23].

The absence of a significant association between willingness in vaccines and attitudes towards COVID-19 vaccination is in line with other studies that found that there was no relationship between attitudes and willingness to accept COVID-19 vaccination in Sungai Raya Village, Sungai Raya District, Kubu Raya Regency [24]. Other characteristics such as employment, income, personal and family history of exposure to COVID-19 also do not have a significant relationship with attitudes towards COVID-19 vaccination in the people of Medan Denai Subdistrict. Many other factors that can affect a person's attitude, attitude will be influenced by personal experiences, culture, people who are considered important, the media of the period, educational institutions, and emotions. From these factors, there are factors that have a big influence on knowledge, namely personal experience, mass media, and educational institutions. Variable personal and family vaccination histories had no significant association with attitudes to COVID-19 vaccination. This is not in line with the basic theory of attitude formation, personal experience should leave a deep impression, if it has this personal experience, and the attitude will be more malleable and occur in situations involving emotional factors [19]. Attitude formation is influenced by many factors, namely, personal experiences, culture, others that are considered important, mass media, educational/ religious institutions, and emotional levels [25].

Our results also found no meaningful association between age characteristics and behavior. This is in line with the previous research that stated that age has no relationship with respondents' attitudes about preventing COVID-19 transmission [26]. Getting older does not guarantee a person will have a positive attitude; this is because welfare, social support and community participation (the environment) have associations with the emergence of a positive attitude [27]. The absence of a significant association between sex and behavior is in line with previous research [28] while education levels have no meaningful relationship with people's behavior about COVID-19 vaccination. These results are not in line with research that mentions there is a relationship between education levels and COVID-19 prevention behavior in the people of North Sulawesi with a value (p < 0.01). The level of education also affects one's knowledge and health knowledge will affect behavior as a medium-term result of health education, then health behavior will affect the increasing indicators of public health as the output of health education [29]. Education influences human behavior and if the acceptance of new behavior is based on knowledge, awareness, positive attitudes then the behavior will be fixed [30].

In this study, there was no significant association between work, a history of exposure to COVID-19 and behaviors about COVID-19 vaccination.

This is in line with other studies showing that people's perceptions are not related to work and a history of COVID-19 disease [31]. There is no significant association between income and COVDI-19 vaccination behavior in the people of Medan Denai Subdistrict. This is not same with other studies that have found a significant link between economic status and cervical cancer vaccination behavior [32]. These differences in outcomes suggest that socioeconomic circumstances influence the process of changing health status because it will affect thinking or beliefs so that it can lead to changes in health behaviors [33].

We found a significant association between the personal history of COVID-19 vaccination and the behavior about COVID-19 vaccination. This is in accordance with the theory that a positive attitude will be followed by behavior that refers to the experiences of others or can also be based on the many or least experiences of a person [34]. It is assumed that more experiences experienced by respondents who have been vaccinated COVID-19 than respondents who have not vaccinated COVID-19, as well as against cultural factors, the influence of others (parents), mass media, education/religion, and emotional levels will affect the level of behavior of respondents to COVID-19 vaccination. The absence of a significant association between willingness in vaccines and behavior about COVID-19 vaccination contrasts with research that shows there is a behavioral relationship with willingness to receive the COVID-19 vaccine in Sungai Raya Village [23]. These differences in outcomes suggest that factors affecting people's willingness to receive vaccinations are multifactorial such as age, education level, occupation, marital status, religion, and ethnicity [11].

Conclusions

People in Medan Denai Subdistrict, Medan City, Indonesia, had sufficient knowledge levels, good attitudes and good behavior related to the COVID-19 vaccine. The level of education, religion, COVID-19 vaccination history affected people's knowledge, attitudes, and behavior regarding COVID-19 vaccination. Education from the government, educational institutions and religious leaders about the COVID-19 vaccine is needed to help the success and acceleration of the COVID-19 vaccination program in Indonesia.

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Supplementary File

Relation of respondent characteristics with behavior regarding COVID-19 vaccination

Subject characteristics	Good n (%)	Sufficient n (%)	p-value
Age group			
17–25 (late teens)	63	12	0.321[a]
26–35 (early adulthood)	7	2	
36–45 (late adulthood)	4	3	
46–55 (early elderly)	8	1	
Gender			
Man	31	11	0.070[d]
Woman	51	7	
Last education			
No education	0	1	0.236[a]
Junior High School	1	0	
Senior High School	50	13	
Diploma	6	0	
Bachelor	24	4	
Graduate	1	0	
Profession			
Not Working	31	11	0.324[a]
Entrepreneur	11	3	
Civil Servants	5	0	
Private Employees	8	1	
Others	27	3	
Religion			
Islamic	7	4	0.240[a]
Catholic Christian	7	1	
Christian Protestant	68	13	
Income			
< 1,500,000	51	11	0.427[a]
1,500,000–2,500,000	12	2	
2,500,000–3,500,000	8	4	
> 3,500,000	11	1	
Personal History of Exposure to COVID-19			
Ever	16	3	1.000[b]
Never	66	15	
Family History of Exposure to COVID-19			
Ever	23	5	0.981[d]
Never	59	13	
Personal History of COVID-19 Vaccination			
Have been vaccinated	67	9	**0.012[b]**
Not vaccinated	15	9	
Family History of COVID-19 Vaccination			
Have been vaccinated	74	13	0.055[b]
Not vaccinated	8	5	
Willingness for the COVID-19 vaccine			
Yes	81	16	0.083[b]
No	1	2	

[a]Kruskal-Wallis test, [b]Fisher's exact test, [d]Chi-square test.