

# Students' Views of Childhood Vaccine Refusal and its Relationship to Health Literacy Levels: A Cross-Sectional Study

## Öğrencilerin Çocukluk Çağı Aşı Reddine Bakışı ve Sağlık Okuryazarlığı ile İlişkisi: Kesitsel Bir Araştırma

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**ABSTRACT Objective:** Vaccination is an important and effective preventive public health practice in protecting and improving the health of children and adults, preventing the spread of communicable diseases, reducing poverty, and strengthening health systems. The current study examines university students' views of childhood vaccine refusal and its relationship to health literacy levels. **Material and Methods:** The research was done in cross-sectional and correlational type. The study was conducted with 1,588 university students. The data were collected face-to-face using the socio-demographic questionnaire form prepared by the researchers and the Türkiye Health Literacy Scale (THLS-32). **Results:** The participants' mean THLS-32 score was 35.57±8.02. While 25% of female students had excellent and 37.4% sufficient health literacy levels, it was 20.6% and 32.3%, respectively for male students. The rate of participants stating that childhood vaccine refusal will adversely affect public health was 51.4%. According to 43.1% of the students, childhood vaccine refusal in society is related to negative information and 39.4% think it is because of side effects. In the study, the health literacy score of those who thought that vaccines had a protective effect on human health was found to be higher. **Conclusion:** In the research, it was determined that the average health literacy scores of the students were higher than the general average of Türkiye. Health literacy levels should be increased to create healthy generations through students -as parents of the future- and to minimize the effects of such negative thoughts.

**Keywords:** Vaccines; health literacy; vaccine refusal; childhood vaccine; students

**ÖZET Amaç:** Aşılama, çocukların ve erişkinlerin sağlığının korunması ve geliştirilmesinde, bulaşıcı hastalıkların yayılmasının önlenmesinde, yoksulluğun azaltılmasında ve sağlık sistemlerinin güçlendirilmesinde önemli ve etkili bir koruyucu halk sağlığı uygulamasıdır. Bu çalışmada, üniversite öğrencilerinin çocukluk çağı aşı reddine ilişkin görüşleri ve bunun sağlık okuryazarlık düzeyleriyle ilişkisi incelenmiştir. **Gereç ve Yöntemler:** Araştırma, kesitsel ve ilişki arayıcı tipte yapılmıştır. Araştırma 1.588 üniversite öğrencisi ile gerçekleştirilmiştir. Veriler, araştırmacılar tarafından hazırlanan sosyodemografik anket formu ve Türkiye Sağlık Okuryazarlığı Ölçeği (TSOY-32) kullanılarak yüz yüze toplanmıştır. **Bulgular:** Katılımcıların ortalama TSOY-32 puanı 35,57±8,02 idi. Kız öğrencilerin %25'i mükemmel ve %37,4'ü yeterli sağlık okuryazarlık düzeyine sahipken, erkek öğrencilerde bu oran sırasıyla %20,6 ve %32,3'tür. Çocukluk çağı aşı reddinin halk sağlığını olumsuz etkileyeceğini belirtenlerin oranı ise %51,4'tür. Öğrencilerin %43,1'ine göre toplumda çocukluk çağı aşı reddi olumsuz bilgi ile ilgili, %39,4'ü ise yan etkilerden kaynaklandığını düşünmektedir. Çalışmada aşıların insan sağlığına koruyucu etkisi olduğunu düşünenlerin sağlık okuryazarlık puanı daha yüksek bulunmuştur. **Sonuç:** Araştırmada öğrencilerin sağlık okuryazarlığı puan ortalamalarının Türkiye genel ortalamasından yüksek olduğu saptanmıştır. Geleceğin ebeveynleri olan öğrenciler aracılığıyla sağlıklı nesiller yetiştirmek ve bu tür olumsuz düşüncelerin etkilerini en aza indirmek için sağlık okuryazarlığı düzeylerinin artırılması gerekmektedir.

**Anahtar Kelimeler:** Aşılar; sağlık okuryazarlığı; aşı reddi; çocukluk çağı aşıları; öğrenciler

Vaccination is an important and effective preventive medicine and public health practice in protecting and improving the health of children and adults, preventing the spread of communicable diseases, reducing poverty, ensuring equity, and

strengthening health systems.<sup>1</sup> According to the Centers for Disease Control and Prevention, immunization is at the top of the list of the ten most important achievements in public health in the 20<sup>th</sup> century.<sup>2</sup> Vaccination both provides individual immunity and

**TO CITE THIS ARTICLE:**

İncedal Sonkaya Z, Daş Geçim GY. Students' views of childhood vaccine refusal and its relationship to health literacy levels: A cross-sectional study. Türkiye Klinikleri J Health Sci. 2024;9(1):52-9.

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Peer review under responsibility of Türkiye Klinikleri Journal of Health Sciences.

**Received:** 31 Mar 2023

**Received in revised form:** 02 Oct 2023

**Accepted:** 03 Oct 2023

**Available online:** 18 Dec 2023

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protects public health. Although there are great differences in vaccine coverage and application between different regions and even countries, if vaccines are not applied properly, it can cause epidemics that have a great impact on individuals and communities.<sup>3</sup>

According to a 2019 report by World Health Organization, approximately 1.5 million people around the world die from diseases that can be prevented by vaccines.<sup>4</sup> On the other hand, the anti-vaccine movement, which dates back to the beginning date of the vaccination, has increased significantly in Türkiye in the last 20 years and an “anti-vaccine” movement has literally started.<sup>5,6</sup> According to Türkiye Demographic and Health Surveys, the rate of 3-26-month-old infants with no vaccinations was 1.6% (approximately 20 thousand infants) in 2008 and this rate increased to 2.9% (approximately 37 thousand infants) in 2013.<sup>6</sup> In the report of the 3<sup>rd</sup> National Vaccine Workshop, the Eastern and Southeastern Anatolia Regions were reported as the places with the highest vaccine refusal rates in Türkiye.<sup>5</sup> Consequently, it is very important for individuals to reach, read, understand, and apply the right information on all health-related issues.<sup>7</sup>

Recent research has revealed poor knowledge of vaccination is associated with low health literacy (HL), male gender, advanced age, not having been vaccinated before, and low education level.<sup>8,9</sup> HL simply refers to the personal ability to find, understand, and use health-related information to protect and maintain health. “HL” is a new concept that brings together people in the fields of health and has been used frequently in recent years. The importance of HL in both preventive and curative medical services is constantly increasing. Higher HL skills are accepted as one of the most important strategies to reduce the increasing vaccine refusal/hesitancy around the world as well as in Türkiye.<sup>10</sup> On the other hand, recent studies indicated that inadequate HL is associated with the inability to access and use health services properly, an increase in the prevalence of communicable and non-communicable diseases, inability to manage diseases correctly, and an increase in the wrong use of drugs.<sup>3</sup>

Only a few studies have examined the refusal of infant and childhood vaccines in Türkiye.<sup>11</sup> However,

vaccine hesitancy/refusal is on the rise in the world and also in Türkiye, and this situation poses significant risks in terms of public health. Accordingly, the current study aims at examining college students’ -as parents of future- views of vaccine refusal and its relationship with HL.

## MATERIAL AND METHODS

### RESEARCH DESIGN

A cross-sectional and correlational study was designed.

### Population and Sample

The population of this study consisted of students enrolled in a program at the Faculty of Health Sciences and Sabuncuoğlu Şerefeddin Health Services Vocational School of Amasya University. A sample selection procedure was not performed. There were a total of 2,250 students in both units. A total of 1,588 students who attended school between September and December 2021, volunteered to participate in the study, and without communication disabilities were included in the study (reach rate of 70.5%).

### DATA COLLECTION TOOLS

The data for this study was collected face-to-face using a socio-demographic information sheet prepared by the authors and Türkiye Health Literacy Scale (THLS-32).

*The socio-demographic information sheet* was prepared by the researchers and consists of questions about age, marital status, education status, information about childhood vaccines (diphtheria, tetanus, polio, hepatitis B, hepatitis A, *Haemophilus influenzae* type b, tuberculosis, measles, mumps, rubella, chickenpox and pneumococcus).

*THLS-32* was the Turkish version of the European Health Literacy Questionnaire. The validity and reliability studies for THLS-32 were carried out by Okyay and Abacıgil and they calculated the internal consistency as 0.982.<sup>12</sup> In the current study, the internal consistency was calculated as 0.933. The scale consists of 32 items on twelve dimensions. Lower scores indicate lower HL.

## ETHICAL APPROVAL

Before conducting the study, ethical permission from Amasya University Non-Interventional Clinical Research Ethics Committee (date: January 08, 2021, no: E-15386878-044-813) and institutional permission (dated November 06, 2020 and numbered E.24035) were obtained. Also, informed consent was received from participants. The research was conducted in accordance with the Declaration of Helsinki.

## ANALYSIS OF THE DATA

R ver. 2.15.3 program [R Core Team (2021). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria] was used for statistical analyzes. The results were reported as minimum, maximum, mean, standard deviation, median, frequency, and percentage values. The Shapiro-Wilk test and graphical examinations were used to examine whether the quantitative data approximate to a normal distribution. Independent-group t-tests were performed to compare normally distributed variables between two groups. For comparison of normally distributed variables between more than two groups, a one-way analysis of variance was conducted. Pearson chi-square test and Fisher-Freeman-Halton exact test were used for comparisons of categorical variables. In the analyses,  $p < 0.05$  was considered statistically significant.

## RESULTS

The participant students were 78.7% female and 21.3% male, aged 17-47 years old with a mean age of  $19.92 \pm 1.82$ . The socio-demographic characteristics of the students are given in Table 1.

Students' comments about childhood vaccine refusal are presented in Table 2. About one-third of the students stated that vaccine refusal has increased, whereas another one-third of them commented that it has decreased. Furthermore, 51.4% of the participants believe that vaccine refusal will adversely affect public health. On the other hand, according to 43.1% of the students, vaccine refusal in the society is because they have read/heard negative things about vaccines, and 39.4% of the students think that is it because they are afraid of the side effects of the vaccines (Table 2).

**TABLE 1:** Socio-demographic characteristics of the participants.

Characteristics	n	%
<b>Gender</b>		
Female	1,249	78.7
Male	339	21.3
<b>Program enrolled</b>		
Midwifery	179	11.3
Nursery	305	19.2
Child development	171	10.8
Disabled care	104	6.5
Physiotherapy	89	5.6
First aid and emergency treatment	180	11.3
Opticianry	98	6.2
Medical laboratory	181	11.4
Medical documentation and secretaryship	203	12.8
Aged care	78	4.9
<b>Monthly income</b>		
Very high	20	1.3
High	324	20.4
Moderate	1,138	71.7
Poor	92	5.8
Extremely poor	14	0.9
<b>How would you evaluate your health?</b>		
Very good	131	8.2
Good	927	58.4
Moderate	475	29.9
Poor/Extremely poor	55	3.4
<b>The first health institution to apply in case of an illness</b>		
Family doctor	488	30.7
State hospital	1,048	66.0
Private hospital	52	3.3
<b>Total</b>	<b>1,588</b>	<b>100.0</b>

The analysis of students' comments about vaccine refusal according to their age and gender is given in Table 3. The results revealed that the rate of female students who believe that vaccines have side effects and vaccine refusal is an individual right was statistically higher than male students ( $p < 0.05$ ). However, the rate of male students who think that vaccines are protective was higher than female students and this difference was significant (Table 3).

The mean THLS-32 scale score of the students was found to be  $35.57 \pm 8.02$ . Furthermore, 25% of female students had excellent and 37.4% sufficient HL level, whereas for male students, this ratio was 20.6% and 32.3%, respectively and this difference was found to be significant ( $p < 0.001$ ). The THLS-32

**TABLE 2:** Students' comments about vaccine refusal.

Items	n	%
What is your view about vaccine refusal in Türkiye?		
Vaccine refuse is increasing	516	32.5
Vaccine refuse is decreasing	481	30.3
Vaccine refusals did not change compared to previous years	44	2.8
I have no idea	547	34.4
If vaccination rejection becomes widespread in society, how will it affect public health?		
I think it will be adversely affected.	816	51.4
I think it will not cause any change.	215	13.5
It will cause an increase in epidemics.	557	35.1
The most important reason for vaccine refusal		
Having read/heard negative things about vaccines	684	43.1
Fear of the side effects of vaccines	626	39.4
Believing that vaccines are useless	132	8.3
Because the vaccines are supplied from abroad.	40	2.5
Negative statements about vaccines by people who are recognized as role models in society	31	2.0
Other	75	4.7
Do vaccines have side effects?		
Yes	1,167	73.5
No	104	6.5
I have no idea	317	20.0
Do vaccines are effective (Do vaccines have protective effects on human health)?		
Yes, they have protective effects on human health	793	49.9
No, I believe that they are useless	53	3.3
I believe that they are partially effective	678	42.7
I have no idea	64	4.0
What are the measures to be taken to reduce/prevent vaccine refusal?		
Conducting scientific research to show vaccines are safe.	779	49.1
Providing education on vaccination/immunization to parents	428	27.0
Making vaccination practices compulsory by the state.	175	11.0
Providing education on this issue to health professionals	106	6.7
Producing vaccines in Türkiye	100	6.3
Does vaccine refusal is an individual right?		
Yes	1,351	85.1
No	237	14.9
Total	1,588	100.0

score indices of the female gender, those who described their general health status as very good, those who stated that the vaccines had no side effects, and those who thought that the vaccines were protective for human health, were found to be higher ( $p<0.05$ ) (Table 4).

## DISCUSSION

Without a doubt, HL and immunization are important primary preventive health services to protect and improve public health. Many studies highlighted the importance of accurate, reliable, and effective com-

munication of physicians and health personnel with patients on drugs and vaccines.<sup>1</sup> Although some strategies are being implemented to reduce increasing vaccine refusal/hesitancy, more initiatives are needed to combat growing negative attitudes and concerns about vaccines.<sup>13</sup>

Our findings indicated that 43.1% of the students had a positive view of vaccine refusal due to reasons such as reading/hearing negative things about vaccines and 39.4% related to being afraid of its side effects. Similar to our results, Hasar et al. found that parents' vaccine refusal was due to negative infor-

**TABLE 3:** The relationship of comments about vaccine refusal with socio-demographic characteristics.

Items	Do vaccines have side effects?			Do vaccines are effective			Does vaccine refusal is an individual right?			Is vaccine refusal related to the education level of families?		
	Yes	No	I have no idea	Yes	Partially	No	Yes	No	Yes	No	Yes	No
Age	19.98±1.94A	19.97±1.38 <sup>AB</sup>	19.69±1.43 <sup>B</sup>	20.08±2.06 <sup>A</sup>	19.82±1.59 <sup>B</sup>	19.38±1.02 <sup>B</sup>	19.86±1.59	20.30±2.77	20.06±1.87	19.77±1.75	η <sup>2</sup> =3.164, p=0.002	
Gender	75.1A	5.8	19.1	49.2	44.5A	3.2A	86.4	13.6	52.7	47.3	η <sup>2</sup> =2.512, p=0.113	
	67.6B	9.1	23.3	52.5	36B	7.1B	80.2	19.8	57.5	42.5	η <sup>2</sup> =7.951, p=0.005	
											η <sup>2</sup> =16.583, p=0.001	
											η <sup>2</sup> =5.357, p=0.001	
											η <sup>2</sup> =8.912, p=0.012	

According to the post-hoc evaluation results, it was determined that there was a significant difference between the categories not shown with the same letters; SD: Standard deviation.

mation about vaccines obtained from the media (86.9%); Özceylan et al. determined that 43.84% of individuals think that vaccines are useless as they don't trust vaccine companies and 23.84% as they received information on television and the internet that the vaccine is harmful.<sup>14,15</sup> Furthermore, we found that 49.9% of the students think that vaccines protect public health, 51.4% think that vaccine refusal negatively affects society, and 35.1% think that vaccine refusal causes epidemics. It is believed that the reason for this discrepancy is that the students have acquired wrong and incomplete information and that the HL level of the society is moderate. Despite such negative views reported in the literature, it can be argued that students who participated in our current study attach importance to vaccines. HL levels should be increased to create healthy generations through students -as parents of the future- and to minimize the effects of such negative thoughts.

In the study, the rate of female students who think that vaccines have side effects (73.5%) and that vaccine refusal is an individual right (85.1%) was found to be higher than male students. Besides, media plays a great role in spreading views and practices about vaccine hesitancy and refusal.<sup>14,16</sup> Moreover, our results showed 43.1% of the students think that society refuses vaccines because of the negative information read/heard about the vaccines, and according to 39.4%, vaccine refusal is related to the fear about the side effects of the vaccines. Studies on vaccine refusal and hesitations among parents were pointed out that vaccine refusal is associated with religious and philosophical reasons, personal beliefs, safety concerns, and insufficient information from healthcare providers.<sup>17,18</sup> It is believed that increasing HL levels can play an important role in the effective implementation of protective services.

Previous studies indicated that the level of parental education is also effective on vaccine refusal. It was found that parents with low education levels had less confidence in healthcare professionals, were more concerned about vaccine safety, and believed less in the necessity and effectiveness of vaccines.<sup>19,20</sup> In our study, the rate of students who thought that parental education was related to vaccine refusal was found to be 53.7%. On the other hand, Gust et al. found that parents with less than 12 years of education do not have sufficient vaccination information compared to parents with post-graduate education.<sup>21</sup>

In the current study, it was found that 73.5% of students believe that vaccines have side effects. Consistent with our findings, in a study carried out by Byström et al., 74.7% of the individuals and in a study by Hasar et al., 96.7% of the individuals stated that they were worried about the side effects of the vaccines.<sup>14,22</sup> Such concerns of parents increase vaccine hesitancy.<sup>23</sup> A majority of parents who

**TABLE 4:** The relationship between students' comments about vaccine refusal and their Türkiye Health Literacy Scale-32 scores.

Characteristics	THLS-32 Index X±SD	Test score, p
Gender		
Female	36.03±7.67	t=3.992 <sup>b</sup> p<0.001
Gender	33.89±9.00	
Program enrolled		
Medical laboratory	36.97±7.70 <sup>AB</sup>	F=2.684 <sup>a</sup> p=0.004
First aid and emergency treatment	36.96±7.60 <sup>AB</sup>	
Disabled care	36.24±8.01 <sup>A</sup>	
Opticianry	36.01±7.63 <sup>A</sup>	
Midwifery	35.82±8.19 <sup>A</sup>	
Child development	35.46±8.53 <sup>A</sup>	
Aged care	35.22±8.38 <sup>A</sup>	
Medical documentation and secretaryship	35.02±8.07 <sup>A</sup>	
Physiotherapy	34.86±8.82 <sup>A</sup>	
Nursery	34.12±7.58 <sup>AC</sup>	
How would you evaluate your health?		
Very good	38.57±7.92 <sup>A</sup>	F=11.279 <sup>a</sup> p<0.001
Good	35.72±7.71 <sup>B</sup>	
Moderate	34.87±8.18 <sup>BC</sup>	
Poor/Extremely poor	32.00±9.56 <sup>C</sup>	
What is your view about vaccine refusal in Türkiye?		
Vaccine refusal is increasing	36.34±7.71 <sup>A</sup>	F=4.766 <sup>a</sup> p=0.003
Vaccine refusal is decreasing	35.77±7.71 <sup>AB</sup>	
Vaccine refusals did not change compared to previous years	36.65±6.34 <sup>AB</sup>	
I have no idea	34.58±8.58 <sup>B</sup>	
Do vaccines have side effects?		
Yes	35.58±7.77 <sup>AB</sup>	F=3.792 <sup>a</sup> p=0.023
No	37.42±8.57 <sup>A</sup>	
I have no idea	34.93±8.62 <sup>B</sup>	
Do vaccines are effective (Do vaccines have protective effects on human health)?		
Yes, they have protective effects on human health	36.80±7.80 <sup>A</sup>	F=13.814 <sup>a</sup> p<0.001
No, I believe that they are useless	33.63±9.14 <sup>B</sup>	
I believe that they are partially effective	34.56±7.75 <sup>B</sup>	
I have no idea	32.74±9.89 <sup>B</sup>	

According to the post-hoc evaluation results, it was determined that there was a significant difference between the categories not shown with the same letters;  
SD: Standard deviation.

refuse childhood vaccines or have concerns believe that the side effects of vaccines are more than what healthcare professionals tell and that the possible side effects outweigh the benefits of vaccines.<sup>23,24</sup>

We found that the mean THLS-32 score of the students was 35.57±8.02 and female students had a higher mean score than the male students. The categorical evaluation of the HL levels showed that 36.3% of the students had sufficient and 24.1% had excellent HL levels. Besides, our results showed that only 8.2% of the students had inadequate HL skills.

The mean THLS-32 score index was calculated as 34.53 in the study of Yılmaz et al. with health students, and as 38.0 by Uysal and Yıldız.<sup>25,26</sup> On the other hand, it was found to be 30.4 in a study by Durusu Tanrıöver et al. examining the general HL level in Türkiye.<sup>27</sup> Consistent with our results, some previous reports indicated that female students had higher HL levels than male students.<sup>25,28,29</sup> These results highlight that women pay more attention to their health, have more information, and are more health-conscious than men. While health authorities develop

strategies to increase HL levels of the public, it is believed that the gender factor consideration can result in more effective results.

Our study showed that students who state their health level as good or very good had significantly higher HL scores than those who state their health level as poor. Previous reports point out that individuals with low HL show poor compliance with preventive and curative medical advice.<sup>30,31</sup> Moreover, HL was found to be associated with several undesirable health consequences such as lower health status, more frequent hospitalization, increased mortality, and high healthcare costs.<sup>8</sup> Our findings support such reports.

HL is a multi-dimensional concept that has significant impacts on immunization and low HL is recognized as a major health problem.<sup>8</sup> In the current study, HL scores of the students who believe that vaccines do not have side effects and they are protective for human health were significantly higher than other students. Consistent with our results, in a study involving 955 participants, Çam et al. found a positive correlation between HL and vaccine knowledge levels.<sup>32</sup> Plus, similar results are reported by many studies.<sup>33,34</sup> Considering that a limited number of studies were conducted with college students on childhood vaccine refusal and HL, college students' such views are believed to play important roles in reducing vaccine refusal and hesitancy in the future.

## CONCLUSION

The concept of HL is an important skill that should be learned and developed to protect and improve the health of not only individuals with a disease but also the whole society. Besides, HL should be prioritized to effectively implement immunization, which is one of the most important steps of public health. In our study, students' mean HL score was found to be higher than the general average in Türkiye. Moreover, a categorical evaluation of students' HL levels showed that 36.3% of the students had sufficient and 24.1% had excellent HL levels. We believe that the reason for higher HL scores is related to the fact that the sample group consists of students enrolled in a health program. Another important finding of the pre-

sent study is that the students' negative views about vaccines change as their HL levels increase. Considering vaccine hesitancy and refusal for childhood vaccines have been increasing rapidly in the world and in Türkiye in recent years, such results obtained with college students are important. It should be noted that as the health workers of the future, students' positive attitudes and thoughts towards vaccination will accelerate the positive reflections in the society.

Based on the findings obtained, it can be argued that increasing the HL levels of university students and organizing symposiums and meetings for students enrolled in programs other than health might be beneficial in eliminating the lack of information. Furthermore, obtaining in-depth insight into vaccine hesitancy and refusal by conducting detailed studies is important to develop more realistic strategies. The current study examined the relationship between students' views of vaccine refusal and their HL levels. We believe that the presented results will make a valuable contribution to the field and guide further studies.

### Source of Finance

*During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.*

### Conflict of Interest

*No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.*

### Authorship Contributions

**Idea/Concept:** Zehra İncedal Sonkaya, Gözde Yıldız Daş Geçim; **Design:** Zehra İncedal Sonkaya, Gözde Yıldız Daş Geçim; **Control/Supervision:** Zehra İncedal Sonkaya; **Data Collection and/or Processing:** Zehra İncedal Sonkaya, Gözde Yıldız Daş Geçim; **Analysis and/or Interpretation:** Zehra İncedal Sonkaya, Gözde Yıldız Daş Geçim; **Literature Review:** Zehra İncedal Sonkaya, Gözde Yıldız Daş Geçim; **Writing the Article:** Zehra İncedal Sonkaya, Gözde Yıldız Daş Geçim; **Critical Review:** Zehra İncedal Sonkaya, Gözde Yıldız Daş Geçim; **References and Fundings:** Zehra İncedal Sonkaya, Gözde Yıldız Daş Geçim.

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