




## Research Article | Araştırma Makalesi

# EVALUATION OF THE QUALITY OF ENGLISH VIDEOS ON YOUTUBE AS A SOURCE OF INFORMATION ABOUT PREIMPLANTATION GENETIC DIAGNOSIS

## PREİMLANTASYON GENETİK TANI HAKKINDA BİLGİ KAYNAĞI OLARAK YOUTUBE'DAKİ İNGİLİZCE VİDEOLARIN KALİTESİNİN DEĞERLENDİRİLMESİ

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### ABSTRACT

**Objective:** Preimplantation genetic diagnosis (PGD) is used in assisted reproductive treatments to assess embryos genetically before uterine transfer. As patients increasingly use YouTube to obtain medical information, the quality of related content requires critical assessment. This study aimed to evaluate the quality and functionality of PGD-related videos on YouTube.

**Materials and Methods:** In the study 100 most-viewed PGD videos uploaded between 06/04/2023 and 08/06/2023 were analyzed. Data recorded included upload date, duration, uploader type, and numbers of views, comments, likes, and dislikes. Videos were assessed using the Video Power Index (VPI), modified DISCERN, Journal of the American Medical Association (JAMA) and Global Quality Scale (GQS). Based on uploader type, videos were categorized as University/Professional Organizations (UOO), Medical Advertising/Profit-Oriented Companies (MPC), or Independent Users (IU).

**Results:** A significant difference was found in modified DISCERN scores ( $p=0.042$ ), with the IU group scoring lower than the others, while JAMA scores did not differ significantly ( $p=0.155$ ). GQS scores varied significantly ( $p=0.002$ ), with the IU group showing the lowest quality and the UOO group the highest DISCERN and GQS scores. Video duration positively correlated with content quality. Viewer engagement was unrelated to quality, whereas healthcare professionals preferred longer, more comprehensive videos.

**Conclusion:** Videos produced by healthcare professionals demonstrated higher quality and reliability. Video recency did not significantly affect viewer engagement, and no significant association was found between professional quality scores and viewer preferences. Expert-generated videos based on reliable sources, up-to-date literature, and established scoring systems may improve the usefulness of medical information on YouTube.

**Keywords:** Preimplantation genetic diagnosis, YouTube, in vitro fertilization, embryology.

### Öz

**Amaç:** Preimplantasyon genetik tanı (PGT), yardımcı üreme tedavilerinde embriyoların uterusu transfer edilmeden önce genetik analizini içeren bir yöntemdir. Hastaların tıbbi bilgi edinmek için kullandığı bir platform olan YouTube, içerik kalitesi açısından dikkatlice değerlendirilmelidir. Bu çalışma, YouTube'da PGT ile ilgili videoların kalitesini ve işlevselliğini değerlendirmektedir.

**Gereç ve yöntemler:** Çalışmada 06/04/2023- 08/06/2023 tarihleri arasında YouTube'da en çok izlenen 100 PGT videosu incelendi. Yükleme tarihi, süresi, yükleyici türü, yorum, görüntülenme, beğeni ve beğenmemeye sayıları kaydedildi. Değerlendirmede Video Power Index (VPI), modifiye DISCERN, Journal of the American Medical Association (JAMA) ve Global Quality Scale (GQS) kullanıldı. Videolar Üniversite/Profesyonel Kuruluşlar (UOO), Tıbbi Reklam/Kâr Odaklı Şirketler (MPC) ve Bağımsız Kullanıcılar (IU) olarak üç gruba ayrıldı.

**Bulgular:** Modifiye DISCERN parametresinde gruplar arasında anlamlı farklılık bulundu ( $p=0,042$ ); IU grubu diğer gruplardan anlamlı derecede düşüktü. JAMA'da fark tespit edilememişken ( $p=0,155$ ); GQS parametresinde gruplar arasında anlamlı fark olduğu belirlendi ( $p=0,002$ ). IU grubu en düşük kalite düzeyine sahipti. UOO grubunda daha yüksek DISCERN ve GQS puanları gözlemlendi. Video süresi ile içerik kalitesi arasında pozitif korelasyon bulundu. İzleyicilerin video içeriğinin kalitesine öncelik vermediklerini, sağlık profesyonellerinin ise daha kapsamlı bilgi sunan uzun videoları tercih ettikleri gözlemlenmiştir.

**Sonuçlar:** Sağlık profesyonelleri tarafından üretilen videolar daha yüksek kalite ve güvenilirliktedir. Araştırma, videoların güncelliğinin izleyiciler üzerinde önemli bir etkisi olmadığını ve sağlık profesyonellerinin puanları ile izleyici tercihleri arasında önemli bir ilişki olmadığını göstermiştir. YouTube'da yayınlanan videoların, güvenilir bilgi kaynaklarına ve güncel literatüre dayalı olarak, yerleşik puanlama sistemleri doğrultusunda uzmanlar tarafından hazırlanması yararlılığını artıracaktır.

**Anahtar Kelimeler:** Preimplantasyon genetik tanı; YouTube; in vitro fertilizasyon; embriyoloji

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## Introduction

In the contemporary digital age, YouTube has emerged as a multifaceted platform that not only entertains and educates but also influences public understanding and perceptions of complex scientific and medical subjects.<sup>1</sup> YouTube plays an important role in education, offering many benefits to both students and educators. It does this in many ways, including access to diverse content, visual and engaging learning, accessibility and flexibility, supplemental learning, global learning community, and skill development. In addition, low-cost access, feedback and assessment make YouTube the preferred choice for education.<sup>2,3</sup>

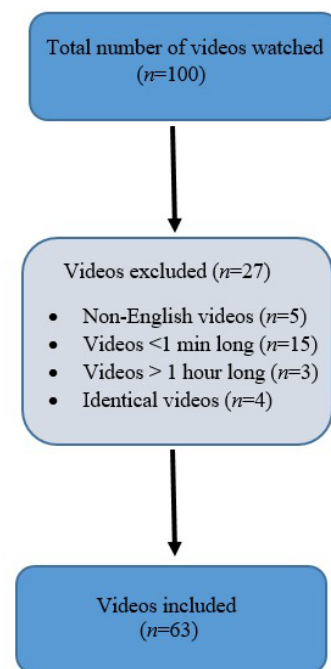
In addition to its educational uses, it is becoming one of the main sources of information and research for the diagnosis and treatment of diseases that patients are particularly curious about.<sup>4</sup> It provides a space for researchers, medical professionals and educators to share their expertise, thereby influencing public perception and awareness of these cutting-edge technologies. However, the dynamic nature of YouTube can also present challenges, as information can vary in accuracy, completeness and reliability.<sup>1,3</sup>

One such important issue is the preimplantation genetic diagnosis (PGD), reproductive technology with significant ethical, societal, and medical implications. PGD involves the screening of embryos prior to implantation, allowing the selection of embryos without certain genetic disorders or chromosomal abnormalities.<sup>5</sup> Nowadays, increasing number of in vitro fertilization treatments and the search for a healthy baby, especially by parents with genetic diseases, have increased the importance of PGD.<sup>6</sup> By using PGD in conjunction with in vitro fertilization (IVF), parents can reduce the chance of passing on inherited disorders to their offspring by screening embryos for genetic abnormalities prior to implantation. The process involves removing one or more cells from early-stage embryos and subjecting them to genetic analysis.<sup>7</sup> This technique has attracted attention for its potential to reduce the incidence of genetic disorders in families. However, a lack of knowledge and experience of PGD among prospective parents has been identified as a barrier to access to this reproductive option, so there is a need to evaluate sources of information.<sup>8</sup>

As a leading video-sharing platform, YouTube plays a key role in disseminating information about various scientific and medical advances, including PGD. By analysing a selection of YouTube videos, this study aims to evaluate the accuracy of the information presented, identify common narratives or misconceptions, and assess the potential impact of these videos on public opinion and decision-making regarding reproductive choices. In addition, this research aims to shed light on the role of YouTube as a medium for scientific communication, highlighting the need for reliable and accessible information in a field as complex as reproductive genetics.

## Methods

Users of YouTube can watch, like, share, comment on, and upload videos on the platform. Prior to data collection, the YouTube search history was cleared to minimise algorithmic bias. The term 'preimplantation genetic diagnosis' was entered into the search bar, and the 'relevance' filter was applied. Commercial content, non-visual or non-audio material, non-English videos, and videos lasting longer than one hour or shorter than one minute were excluded from the study. In cases where duplicate videos were identified, only the first instance was included in the analysis.<sup>9,10</sup> More than 90% of YouTube users only watch the first 60 videos in their search results to find the information they need. In our analysis, the first 100 videos were taken into account with the assumption that visitors would not view more than 100 videos for search results. Based on the previous studies the top 100 videos were watched between 06/04/2023 and 08/06/2023. 15 videos were less than 1 minute. 3 videos were longer than 1 hour. 5 videos were not in English. 14 videos were the same.<sup>11</sup> Of the 100 videos, 63 were analysed by two medical doctors who completed their specialisation in histology and embryology following the medical specialty examination (Figure 1). On June 8, 2023, the following information was recorded: video names, source URLs, view counts, duration since upload (including the final assessment date), and number of likes, dislikes, and comments. Ethical approval is not required as our study did not involve human subjects and included videos open to the public.



**Figure 1.** Selection process of included and excluded videos

The videos were considered in 3 groups. The first group was evaluated as Universities/Occupational Organizations (UOO), the second group was Medical Ad/Profit-Oriented Companies (MPC), the third group was evaluated as independent users (IU).

### Video Popularity

The Video Power Index (VPI), which measures the popularity of videos, was calculated using the following formula.

Like rate =  $[\text{like} \times 100 / (\text{like} + \text{dislike})]$

View rate (number of views/day)

$VPI = [(\text{like rate} \times \text{view rate}) / 100]$ .<sup>12</sup>

### Quality Assessment

The DISCERN scoring system is a scale used to evaluate the quality of written information developed by Charnock et al. We used the modified DISCERN scale, which Singh et al. constructed by shortening the original scale. Information and visual media were evaluated with a five-question modified DISCERN scale that assesses the reliability, clarity and impartiality of the content.<sup>9,13</sup> The videos were evaluated in terms of quality according to the total score by giving 0 or 1 points according to the answers to the questions. Very low quality is indicated by one-point, poor quality by two, medium quality by three, good quality by four, and very good quality by five points.<sup>9,13-15</sup>

One of the most popular scoring methods for evaluating medical information from websites is the Journal of the American Medical Association (JAMA) scoring system. Silberg et al. proposed the Journal of American Medical Association (JAMA) benchmarking criterion for evaluating the information dependability of videos. A total JAMA score is calculated by assigning points to each of the four basic standards, which include authorship, clearly stated and properly cited sources, currency of information, and disclosure of potential conflicts of interest. A score of zero indicates the lowest accuracy and reliability, while a score of four indicates the highest accuracy and reliability.<sup>16</sup>

The Global Quality Scale (GQS) is a 1–5 scale that evaluates the overall information quality, flow, and educational relevance of content. A high score indicates good quality and useful information. There are three quality levels: (1-2) low, (3) medium and (4-5) high educational quality.<sup>9,17,18</sup> Videos are categorized as "useful" ( $GQS > 3$ ) or "not useful" ( $GQS \leq 3$ ) in GQS assessments. "Useful videos" are defined as those that can be suggested as qualitative learning materials and that reasonably add to patients' knowledge.<sup>12</sup>

The suggested YouTube videos were watched by two specialists in histology and embryology at the same time. Modified DISCERN, JAMA, and GQS rating systems were used to assign ratings to the videos (Table 1).

### Statistical analysis

The data were analyzed using IBM SPSS version 21. The distribution of the data was examined with the Shapiro-Wilk test, and it was observed that none of the data

followed a normal distribution. The median values of the modified DISCERN, JAMA, and GQS scores were calculated. Since these data did not show a normal distribution, group differences were determined using the Kruskal-Wallis test. Differences between groups were considered significant for  $p$ -values  $< 0.05$ . As all data did not follow a normal distribution, correlations between parameters were analyzed using the Spearman correlation test. Correlation values between 0 and 1 were interpreted such that values close to 1 indicated a high correlation, and those close to 0 indicated a low correlation. Accordingly, correlations between 1 and 0.80 were classified as very high, 0.8-0.6 as high, 0.6-0.4 as moderate, 0.4-0.2 as low, and 0.2-0 as weak.

### Results

Video names, video source links, number of views, time since the video was uploaded (including end date), and number of likes, dislikes, and comments were recorded. The quality and reliability of the videos were evaluated using the GQS and modified DISCERN tool respectively.<sup>19</sup> In the modified DISCERN parameter, the mean and median values were as follows: for the UOO group, the mean was  $2.512 \pm 1.186$  and the median was 2 (min 1 – max 5); for the MPC group, the mean was  $2.385 \pm 1.044$  and the median was 2 (min 1 – max 4); and for the IU group, the mean was  $1.444 \pm 1.509$  and the median was 1 (min 0 – max 5) (Table 2). The Kruskal-Wallis test conducted to determine group differences revealed a significant difference between groups for the DISCERN parameter ( $p=0.042$ ). No significant difference was found for the JAMA parameter ( $p=0.155$ ), while a significant difference was observed for the GQS parameter ( $p=0.002$ ) (Table 2). According to the  $p$  values obtained as a result of the Kruskal-Wallis test in the data in the Table 3, there is no difference between the groups in all parameters ( $p > 0.05$ ) (Table 3).

In the correlation analysis presented in Table 4, the results show a moderate positive correlation between modified DISCERN and Length ( $r=0.449$ ,  $p < 0.001$ ) and JAMA ( $r=0.554$ ,  $p < 0.001$ ), while there is a high positive correlation between modified DISCERN and GQS ( $r=0.639$ ,  $p < 0.001$ ). There is also a moderate positive correlation between GQS and JAMA ( $r=0.400$ ,  $p < 0.001$ ) and between GQS and Length ( $r=0.449$ ,  $p < 0.001$ ). The positive correlations with the Length parameter indicate that the duration of the video has a significant enhancing effect on quality. On the other hand, a negative low correlation between Length and Days since upload ( $r=-0.389$ ,  $p < 0.01$ ) suggests that as the upload date becomes more distant, the duration significantly decreases. A positive low correlation between video length and comments ( $r=0.266$ ,  $p=0.05$ ) indicates that as the duration increases, the number of comments may also increase. The number of views shows a high positive correlation with comments ( $r=0.604$ ,  $p < 0.001$ ) and dislikes ( $r=0.629$ ,  $p=0.001$ ), and a very high correlation with the number of likes ( $r=0.802$ ,  $p < 0.001$ ) and VPI

( $r=0.956$ ,  $p<0.001$ ). The increase in views is strongly associated with significant increases in the parameters of comments, likes, and dislikes. A negative low but significant correlation was found between the video upload time and dislikes ( $r=-0.271$ ,  $p<0.05$ ). A strong positive correlation was observed between the number of comments and views ( $r=0.604$ ,  $p<0.001$ ), likes ( $r=0.753$ ,  $p<0.001$ ), dislikes ( $r=0.670$ ,  $p<0.001$ ), and VPI ( $r=0.667$ ,  $p<0.001$ ).

Although there is a high correlation between VPI and the number of likes and views due to their inclusion in the calculation, the significant positive correlation between VPI and comments ( $r=0.667$ ,  $p<0.001$ ) indicates that

videos with higher like rates and view counts receive more comments.

Contrary to expectations, video upload time did not have a significant correlation with any parameters other than dislikes ( $r=-0.271$ ,  $p<0.05$ ) and length ( $r=0.389$ ,  $p<0.01$ ). It was observed that whether the videos are up-to-date or not does not have a significant impact on viewers. Furthermore, no significant correlation was found between the scores of health professionals and the preferences of viewers. This suggests that viewers do not consider the quality of the video content, whereas health professionals assign higher scores to longer videos that contain more information and content, in contrast to viewers.

**Table 1.** Quality assessment scoring systems

<b>Modified DISCERN scoring system</b>			
		<b>Yes</b>	<b>No</b>
Are the aims clear and achieved?		1 Point	0 Point
Are reliable sources of information used?		1 Point	0 Point
Is the information presented balanced and unbiased?		1 Point	0 Point
Are additional sources of information listed for viewers?		1 Point	0 Point
Are areas of uncertainty mentioned?		1 Point	0 Point
<b>The JAMA scoring system</b>			
<b>Section</b>		<b>Yes</b>	<b>No</b>
<b>Attribution</b>	References and sources for all content should be listed clearly, and all relevant copyright information should be noted.	1 Point	0 Point
<b>Authorship</b>	Authors and contributors, their affiliations and relevant credentials should be provided.	1 Point	0 Point
<b>Disclosure</b>	Website "ownership" should be prominently and fully disclosed, as should any sponsorship, advertising, underwriting, commercial funding arrangements or support, or potential conflicts of interest	1 Point	0 Point
<b>Currency</b>	Dates when content was posted and updated should be indicated.	1 Point	0 Point
<b>Global Quality Scale (GQS) Criteria</b>			
<b>Description of Quality</b>		<b>Grade</b>	
Poor quality and unlikely to be of use for education.		1	
Poor quality and of limited use to education because some information is present		2	
Suboptimal quality and flow; somewhat useful to education; important topics are missing; some information is present		3	
Good quality and flow; useful to education because most important topics are covered		4	
Excellent quality and flow; highly useful to education.		5	

**Table 2.** Descriptive analysis of modified DISCERN, JAMA and GQS

		Universities/Occupational Organizations (n=41)	Medical Ad/Profit-Oriented Companies (n=13)	Independent Users (n=9)	p – value
<b>Modified DISCERN</b>	<b>Mean ± SD</b>	2.512 ± 1.186	2.385 ± 1.044	1.444 ± 1.509	<b>0.042</b>
	<b>Median (Min-Max)</b>	2 (1-5)	2 (1-4)	1 (0-5)	
	<b>Rank</b>	34.573	33.423	18.222	
<b>JAMA</b>	<b>Mean ± SD</b>	3.122 ± 0.458	2.923 ± 0.641	2.667 ± 0.866	0.155
	<b>Median (Min-Max)</b>	3 (2-4)	3 (2-4)	3 (1-4)	
	<b>Rank</b>	34.427	29.231	24.944	
<b>GQS</b>	<b>Mean ± SD</b>	2.731 ± 1.225	2.462 ± 0.877	1.222 ± 0.667	<b>0.002</b>
	<b>Median (Min-Max)</b>	3 (1-5)	3 (1-4)	1 (1-3)	
	<b>Rank</b>	35.829	33.231	12.778	

GQS: Global Quality Scale, JAMA: Journal of the American Medical Association

**Table 3.** Descriptive Analysis of other parameters

Descriptives		N	Mean	Std. Deviation	P Value
<b>Length (Second)</b>	Universities/Occupational Organizations	41	435.902	601.169	0.171
	Medical Ad/Profit-Oriented Companies	13	207.462	63.803	
	Independent Users	9	894.889	1028.786	
<b>Views</b>	Universities/Occupational Organizations	41	7341.024	12769.682	0.352
	Medical Ad/Profit-Oriented Companies	13	9405.308	14395.086	
	Independent Users	9	7538.889	8793.711	
<b>Days since upload</b>	Universities/Occupational Organizations	41	2510.659	1196.679	0.627
	Medical Ad/Profit-Oriented Companies	13	2323.385	999.828	
	Independent Users	9	2211.667	654.742	
<b>Comments</b>	Universities/Occupational Organizations	41	3.195	7.163	0.189
	Medical Ad/Profit-Oriented Companies	13	2.077	3.818	
	Independent Users	9	7.111	12.544	
<b>Likes</b>	Universities/Occupational Organizations	41	39.415	77.583	0.099
	Medical Ad/Profit-Oriented Companies	13	63.846	127.019	
	Independent Users	9	58.000	64.506	
<b>Dislikes</b>	Universities/Occupational Organizations	41	1.780	4.704	0.226
	Medical Ad/Profit-Oriented Companies	13	3.077	5.823	
	Independent Users	9	4.778	7.645	
<b>VPI</b>	Universities/Occupational Organizations	41	3.860	8.515	0.377
	Medical Ad/Profit-Oriented Companies	13	4.660	7.191	
	Independent Users	9	3.697	4.594	

**Table 4.** Correlation of the parameters

r	Modified DISCERN	JAMA	GQS	Length (Second)	Views	Days since upload	Comments	Likes	Dislikes	VPI
<b>Modified DISCERN</b>	-	0.554 <0.001	0.639 <0.001	0.449 <0.001	0.184 0.150	-0.076 0.555	0.143 0.264	0.171 0.181	0.058 0.649	0.179 0.160
<b>JAMA</b>	0.554 <0.001	-	0.400 <0.001	0.211 0.097	-0.028 0.827	-0.059 0.647	-0.022 0.863	-0.070 0.587	-0.059 0.644	-0.028 0.828
<b>GQS</b>	0.639 <0.001	0.400 <0.001	-	0.342 <0.01	0.154 0.229	-0.157 0.220	0.013 0.918	0.144 0.261	0.058 0.650	0.187 0.143
<b>Length (Second)</b>	0.449 <0.001	0.211 0.097	0.342 <0.01	-	0.089 0.486	-0.389 <0.01	0.266 0.05	0.246 0.052	0.198 0.120	0.161 0.206
<b>Views</b>	0.184 0.150	-0.028 0.827	0.154 0.229	0.089 0.486	-	0.001 0.992	0.604 <0.001	0.802 <0.001	0.629 0.001	0.956 <0.001
<b>Days since upload</b>	-0.076 0.555	-0.059 0.647	-0.157 0.220	-0.389 <0.01	0.001 0.992	-	-0.241 0.057	-0.245 0.053	-0.271 <0.05	-0.246 0.052
<b>Comments</b>	0.143 0.264	-0.022 0.863	0.013 0.918	0.266 <0.05	0.604 <0.001	-0.241 0.057	-	0.753 <0.001	0.670 <0.001	0.667 <0.001
<b>Likes</b>	0.171 0.181	-0.070 0.587	0.144 0.261	0.246 0.052	0.802 <0.001	-0.245 0.053	0.753 <0.001	-	0.722 <0.001	0.847 <0.001
<b>Dislikes</b>	0.058 0.649	-0.059 0.644	0.058 0.650	0.198 0.120	0.629 <0.001	-0.271 <0.05	0.670 <0.001	0.722 <0.001	-	0.667 <0.001
<b>VPI</b>	0.179 0.160	-0.028 0.828	0.187 0.143	0.161 0.206	0.956 <0.001	-0.246 0.052	0.667 <0.001	0.847 <0.001	0.667 <0.001	1.000

The upper value shows the correlation value and the lower value shows the p value. Between 1-0,80 shows very high correlation, 0,8-0,6 shows high correlation, 0,6-0,4 shows moderate correlation, 0,4-0,2 shows low correlation and 0,2-0 shows weak correlation. VPI: Video Power Index, GQS: Global Quality Scale, JAMA: Journal of the American Medical Association

## Discussion

PGD, a method used to increase IVF success rates or to reduce the risk of having a child with a single gene or chromosomal condition in high-risk, carrier couples, allows the genetic status of the embryo to be evaluated and pregnancy can be achieved by transferring embryos with intact genetic material. Biopsy of the developing embryo before transfer is an invasive procedure that allows for genetic evaluation of the embryo.<sup>20</sup> Selecting unaffected embryos improves implantation and live birth rates per embryo.<sup>21</sup>

YouTube is a popular tool for information retrieval with over 2.1 billion monthly active users worldwide and over 122 million daily users. Examining the information on this platform is essential, especially for an illness that is frequently misunderstood and has the potential to significantly affect quality of life. On this social media network, a lot of doctors whether they are employed by hospitals or operate independently share their professional advice. These recommendations could be objective and purely focused on informing the public, with no ulterior objectives, or they could be biased and meant to draw attention to the relevant medical institutions.<sup>22</sup>

The widespread accessibility of YouTube makes it a valuable resource for patients seeking information about medical conditions. The accuracy and reliability of these videos and the information they contain can sometimes be a cause for concern.<sup>23-25</sup>

According to a 2018 national health survey, 33% of patients used YouTube for medical education. In addition to text resources, YouTube's video format is a powerful educational tool for both patients and healthcare professionals.<sup>26,27</sup>

This study aimed to evaluate the quality and reliability of PGD-related information available on YouTube.

In the studies conducted, the scales used in the evaluation of written scientific materials such as modified DISCERN and JAMA are also used in studies related to videos on the internet. Azer et al. suggested the development of an appropriate method and scales for the evaluation of visual publications such as videos.<sup>28</sup> GQS was used for non-specific evaluation of the educational quality of videos.<sup>18</sup> VPI measures the overall performance and impact of the video on various platforms. It considers factors such as the number of views, engagement metrics (likes, shares, comments), social media influence and overall reach. VPI helps to assess the popularity and effectiveness of a video.<sup>23-25,29</sup>

Sahin et al. investigated YouTube as an information source in retinopathy of prematurity. They used VPI value, GQS, and modified DISCERN scale in their study and as a result, they found that the videos added by IU group were of lower quality than those added by health professionals.<sup>30</sup> In our study, although the VPI value was not statistically significant between the groups, the videos uploaded by IU group in the GQS and modified DISCERN evaluations were statistically significantly lower than the other groups. Our study supports the findings of

Sahin et al. and shows the importance of the source of videos containing medical information on YouTube.

In our study, JAMA and modified DISCERN scores were found to be moderate correlated and these scores were found to be high in UOO and MPC groups. Thus, we have again observed that information reliability is higher in individuals and institutions with medical education or working in the health field.

Erdem et al. showed that JAMA, GQS values were low in the evaluation of kyphosis-related videos on YouTube.<sup>31</sup> Stogowski et al. also conducted a video review of anterior lumbar interbody fusion and concluded that the average modified DISCERN score and overall quality remained low.<sup>32</sup> Unal-Ulutatar et al. found that 73% of the videos were useful in their study using the words "systemic sclerosis" and "scleroderma".<sup>33</sup> Ng et al. also emphasized the availability of reliable and high-quality YouTube videos with useful information about systemic lupus erythematosus.<sup>34</sup> The inconsistencies in the results of these studies may be due to differences in the areas studied.

Our study showed that the YouTube videos evaluated were not as useful to patients as desired, and that the lowest scores among the groups belonged to IU group. The quality and reliability of health videos shared on YouTube are generally average or below average. In a study by Osman et al. on the quality of health information on YouTube, the mean modified DISCERN score of the videos analysed was 2.36, and the mean GQS score was 2.68.<sup>27</sup>

In a different study, Kizilet et al. determined the mean values of the videos about labiaplasty to be 2.29 on the modified DISCERN scale and 2.75 on the GQS scale.<sup>15</sup> In our study, the mean modified DISCERN score was 2.52 in the UOO group, 2.38 in the MPC group, and 1.44 in the IU group. The mean GQS scores were 2.73 in the UOO group, 2.46 in the MPC group, and 1.22 in the IU group, all of which were consistent with findings from previous studies.

In a study conducted by Mylavarapu et al., the quality of videos was evaluated based on the identity of the uploader. The findings indicated that videos uploaded by medical professionals, specifically doctors and hospitals, exhibited the highest quality. The researchers discovered that videos published by sources other than medical professionals, healthcare organisations, hospitals and news agencies exhibited a higher VPI than videos published by these entities.<sup>35</sup> In contrast, Celik et al. observed that videos published by medical professionals exhibited a higher VPI in their investigation of rotator cuff repair.<sup>36</sup> The results of our study indicate that there was no statistically significant difference between VPI values. However, the IU group exhibited lower values than the other groups, which supports the findings of Çelik et al. The majority of YouTube users are not medical professionals; therefore, they may not have fully understood what doctors or healthcare professionals were attempting to convey in their uploaded videos, or the information presented may not have met their expectations.

Similar findings were reported by Ferhatoğlu et al. who found a negative relationship between video popularity and video quality ratings.<sup>37</sup> Biggs et al. discovered that shorter videos are watched more than longer videos.<sup>38</sup> In our study, shorter videos were generally watched more, but the modified DISCERN score tended to increase as video length increased.

According to Nicholl et al. study, 62% of parents preferred trustworthy information, 61% chose correct information, and 65% preferred up-to-date information.<sup>39</sup>

Songur et al. discovered that the GQS and JAMA scores were poor and the DISCERN evaluation was moderate in their video investigation on retinal detachment. They emphasized that even though there are a good number of videos on the topic on YouTube, they are of poor quality and not very helpful as a source.<sup>40</sup>

In our opinion, the inconsistencies in the results of the studies may be due to differences in the areas under investigation.

One of the main limitations of this study is that only English-language videos were analyzed, and the number of videos in each group was not equal. The exclusion of non-English content may have introduced a potential language bias, thereby limiting the generalizability of the findings to videos in other languages. Furthermore, YouTube is a dynamic social media platform where new content is continuously uploaded and engagement metrics such as likes and comments can change over time. Therefore, analyzing only a specific set of videos uploaded within a defined time frame represents another limitation. Finally, the fact that different evaluators rated the videos using the GQS may have introduced subjectivity and inter-rater variability in the interpretation and scoring process.

In conclusion, today, the internet is one of the most important sources of medical information. Our study highlighted the importance of medical information provided through YouTube, a social media platform. Users searching for information about PGD on YouTube may encounter inadequate, inaccurate and sometimes misleading information. Particularly for patients and students seeking information, the information provided in the videos should be accurate, reliable and sufficient. These videos also guide patients in making decisions about their health, which have both financial and moral consequences. Particularly in IVF treatment, the aim is to take home a healthy baby, and patients carry both a financial and moral burden in relation to both IVF treatment and the decision to PGD.

We may not be able to control and correct all the information that is publicly available on the internet, especially on social media, but we should at least be aware of how patients are accessing the right information and how it is influencing their decisions.

In most of the videos we reviewed, the uploaders were universities or academic institutions; however, although the quality of the videos was relatively good across groups, it was generally insufficient. We recommend that videos uploaded to platforms such as YouTube, where

videos are uploaded for educational and informational purposes, especially in the field of medicine, should be accurate, sufficient, understandable and reliable, without keeping the video duration too long, by knowledgeable people working in the field of health; we recommend that they comply with quality scores such as modified DISCERN, JAMA and GQS.

### Author Contributions

AFB; researched literature, analysed the videos and prepared the manuscript, DC; designed the study, researched literature, analysed the videos and prepared the manuscript, HSE; analysed data and prepared manuscripts. All authors contributed to the final manuscript.

### Conflict of Interest

The authors declare that they have no competing interests in this work.

### Ethical Approval

Ethical approval is not required as our study did not involve human subjects and included videos open to the public.

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