Blood Grouping: A Two-Week Prospective Observational Study

Mr. M. Koteswara Rao*., Dr. I. S. Chaitanya Kumar., Dr. Anila Mani., Dr. Lavanya B., Dr. Sindhu Bhargavi., Dr. Sai Chandana P

Dept. of Transfusion Medicine and Hemotherapy, AIIMS, Mangalagiri, Andhra Pradesh, India (Same for all authors)

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ABSTRACT

Background: YouTube has emerged as a prominent platform for medical education, yet the engagement dynamics of blood grouping educational content remain inadequately characterized. Understanding video performance metrics can inform educational strategy development and content optimization.

Objective: To assess the engagement metrics and growth patterns of YouTube videos on blood grouping over a two-week observation period and identify factors associated with viewer engagement.

Methods: A prospective observational study was conducted analyzing 119 YouTube videos on blood grouping identified in February 2025. Videos were assessed at baseline and after two weeks for views and likes. Data were extracted on video duration, content creator type, upload year, and initial engagement metrics. Descriptive statistics and percentage change calculations were performed to characterize engagement patterns.

Results: The 119 videos analyzed accumulated 133,168,691 baseline views (median: 108,532; range: 176-36,770,813) and generated 2,247,000 likes. Over two weeks, videos demonstrated a mean increase of 0.51% in views (95% CI: 0.45-0.57%) and 0.40% in likes (95% CI: 0.34-0.46%). Video duration ranged from 6 seconds to 21 minutes 14 seconds. Ultra-short videos (<1 minute, n=38) achieved highest initial reach but lower sustained engagement compared to longer educational content (5-20 minutes, n=27). Content from academic physicians and established educational channels demonstrated superior engagement metrics. Videos in regional languages (Hindi, Telugu, Urdu) represented 24.4% of content, indicating diverse linguistic accessibility.

Conclusion: YouTube serves as a significant educational resource for blood grouping education with substantial reach. However, engagement growth remains modest over short observation periods. Video duration, content creator credibility, and linguistic diversity influence engagement patterns. Medical educators should optimize video length and leverage platform analytics to enhance educational impact.

Limitations: This study was based on qualitative assessment, which may involve subjective interpretation of the findings. Single platform analysis, short observation period, lack of content quality assessment, and absence of viewer demographic data limit generalizability. Selection bias may exist as videos were identified at a single time point.

Keywords: YouTube, Blood Grouping, Engagement metrics, Educational videos

INTRODUCTION

Blood grouping knowledge constitutes fundamental competency in transfusion medicine, clinical laboratory science, and patient safety.(1) The ABO blood group system, discovered by Karl Landsteiner in 1901, remains the most immunogenic and clinically significant blood typing system, with mismatches potentially causing fatal transfusion reactions.(2,3) Accurate blood typing through forward and reverse grouping methodologies is essential for safe blood product administration, organ transplantation, and prevention of hemolytic disease of the newborn.(2)

Traditional medical education has increasingly incorporated digital learning modalities, with video-based platforms offering accessibility, repeatability, and visual demonstration capabilities.(4,5) YouTube, launched in 2005, has emerged as a predominant educational resource, with medical learners reporting high satisfaction with brief, accessible video content that supplements clinical experiences.(6,7) Studies demonstrate that educational videos can increase student engagement by 24.7% and improve examination performance by 9% compared to traditional lecture formats.(8)

Social media platforms, particularly YouTube, facilitate global knowledge dissemination in health sciences education.(9,10) The Free Open Access Medical Education (FOAMed) movement exemplifies this paradigm shift, utilizing digital platforms to deliver high-quality training materials to healthcare professionals worldwide.(11) However, content quality on YouTube remains heterogeneous, with only 19.4% of published studies reporting evaluative outcomes related to instructional effectiveness.(12,13)

Previous research has established that educational interventions incorporating video lectures and practical demonstrations significantly improve blood grouping knowledge, with student comprehension increasing from 14.1-79% to 92-100% following structured educational sessions.(14,15) Despite YouTube's widespread adoption for medical education, systematic evaluation of blood grouping educational content engagement metrics remains limited. Understanding engagement patterns—including views, likes, and growth trajectories—can inform content optimization strategies and guide medical educators in effective digital resource development.

This study aimed to characterize engagement metrics of YouTube videos on blood grouping, assess growth patterns over a two-week period, and identify video characteristics associated with viewer engagement. We hypothesized that video duration, content creator credibility, and production year would significantly influence engagement metrics.

METHODS

Study Design And Setting

A prospective observational cohort study was conducted to evaluate YouTube videos addressing blood grouping education. The study utilized a descriptive observational design, systematically documenting engagement metrics without intervention or manipulation of variables.(16,17) This approach was selected as appropriate for characterizing naturally occurring phenomena and establishing baseline data for future analytical research.

Video Selection And Collection Data

Videos were identified through systematic YouTube searches conducted on February 22-25, 2025, using search terms "blood grouping," "blood typing," "ABO blood group," and "blood group test." Videos were included if they: (1) provided educational content on blood grouping methodology, theory, or clinical application; (2) were publicly accessible; (3) had quantifiable engagement metrics (views, likes); and (4) were active at the time of data collection. Exclusion criteria included: (1) videos unrelated to blood grouping education; (2) duplicate content; (3) videos with restricted access; and (4) purely promotional or commercial content without educational value.

A total of 119 videos meeting inclusion criteria were identified and assessed at baseline (February 22-25, 2025) and follow-up (two weeks post-baseline). This observation period was selected based on video engagement research demonstrating that early engagement patterns (first 24-48 hours) predict longer-term performance, and two-week intervals provide sufficient time to observe meaningful metric changes while minimizing external confounding factors.(18,19)

Data Extraction

For each video, the following variables were systematically extracted and recorded in Microsoft Excel: (1) video title; (2) content creator name and type (academic physician, educational channel, medical laboratory

professional, general content creator); (3) date of upload and year; (4) video duration (seconds/minutes); (5) number of views at baseline and two-week follow-up; (6) number of likes at baseline and two-week follow-up; (7) primary language of content (English, Hindi, Telugu, Urdu, Malayalam, other).

Engagement metrics were recorded exactly as displayed on the YouTube platform. For videos displaying abbreviated counts (e.g., "858 K"), values were converted to numerical form (858,000) for analysis. Videos with missing like counts (displayed as "N/A") were documented but excluded from like-related analyses.

Video Catagorization

Videos were categorized by duration into four groups based on educational video research and viewer retention patterns:(20,21) (1) ultra-short videos (<1 minute); (2) short videos (1-5 minutes); (3) medium videos (5-10 minutes); (4) long videos (10-20+ minutes). Content creator types were classified based on channel descriptions and credentials displayed.

Data Analysis

Descriptive statistics were calculated for all continuous variables, including means, medians, standard deviations, and ranges. Categorical variables were summarized using frequencies and percentages. Percentage change in views and likes was calculated using the formula: [(Follow-up value - Baseline value) / Baseline value] × 100. Growth rates were analyzed both for individual videos and stratified by duration category and content creator type.

Data were analyzed using Microsoft Excel (Microsoft Corporation, Redmond, WA, USA). Results are presented as mean ± standard deviation (SD) or median (interquartile range [IQR]) as appropriate based on data distribution. Statistical significance was not formally tested given the descriptive nature of the study design and absence of comparison groups.

Ethical Considerations

This study utilized publicly available data from a social media platform. No human subjects were directly involved, no personal identifying information was collected, and no intervention was performed. Ethical approval was not required according to institutional guidelines for studies using publicly accessible online content without individual participant data.

RESULTS

Video Characteristics

A total of 119 YouTube videos on blood grouping were analyzed. Videos were assessed on February 22, 2025 (n=59, 49.6%) and February 25, 2025 (n=60, 50.4%). The median upload date was September 2021 (range: May 2010 - February 2025), indicating both historical content and recent uploads. Video durations ranged from 6 seconds to 21 minutes 14 seconds, with a median duration of 2 minutes 48 seconds (IQR: 58 seconds - 6 minutes 35 seconds).

Duration categories were distributed as follows: ultra-short videos (<1 minute, n=38, 31.9%), short videos (1-5 minutes, n=39, 32.8%), medium videos (5-10 minutes, n=27, 22.7%), and long videos (10-20+ minutes, n=15, 12.6%). Content was predominantly in English (n=90, 75.6%), with substantial representation in Hindi (n=20, 16.8%), Telugu (n=3, 2.5%), Urdu (n=3, 2.5%), and Malayalam (n=1, 0.8%), with two videos excluded from language analysis.

Top 10 most viewed YouTube videos on blood grouping at baseline (February 2025). View counts are shown in millions

Content creators included academic physicians (n=18, 15.1%), established educational YouTube channels (n=47, 39.5%), medical laboratory professionals (n=32, 26.9%), and general content creators (n=22, 18.5%). Notable channels included TED-Ed, Amoeba Sisters, RegisteredNurseRN, Ninja Nerd, and specialized medical laboratory education channels.

Baseline Engagement Metrics

At baseline assessment, the 119 videos had accumulated 133,168,691 total views, with a mean of 1,118,894 views per video (SD: 3,685,412) and median of 108,532 views (IQR: 29,422 - 508,865). The distribution was highly right-skewed, with the most viewed video ("Blood Grouping made easy" by MBBS Physiology - Dr. Waqas Khan) accounting for 27.6% of all baseline views (36,770,813 views). The top 10 videos represented 50.3% of total baseline views, demonstrating concentration of viewership among popular content.

Total likes across all videos at baseline were approximately 2,247,000 (calculated from available data, excluding 8 videos with missing like counts). The mean like count was 19,882 per video (SD: 55,124), with median 2,300 likes (IQR: 209 - 6,900). The like-to-view ratio averaged 1.69%, consistent with published YouTube engagement benchmarks for educational content.(22,23)

Engagement Growth Over Two Weeks

After the two-week observation period, total views increased to 134,849,857, representing an overall growth of 1,681,166 views (1.26% increase). Individual video view growth ranged from 0.02% to 16.04%, with mean growth of 0.51% (SD: 1.24%) and median growth of 0.37% (95% CI: 0.45-0.57%).

Total likes increased to 2,256,000, representing growth of approximately 9,000 likes (0.40% increase). Individual video like growth ranged from 0% to 8.07%, with mean growth of 0.40% (SD: 0.89%) and median growth of 0.28% (95% CI: 0.34-0.46%). The correlation between view growth and like growth appeared positive, with videos demonstrating higher view increases generally showing proportional like increases.

Forty-seven videos (39.5%) showed view growth exceeding 0.50%, while 72 videos (60.5%) demonstrated growth below 0.50%. Eleven videos (9.2%) exhibited view growth exceeding 1.0%, indicating exceptional engagement for the observation period. One video uploaded immediately before the observation period ("Can Your Blood Type Predict Stroke Risk Before 60?" by WION) showed 1.02% view growth, likely influenced by recency effects and algorithmic promotion.

Video Duration And Engagement

Mean percentage change in views and likes over 2 weeks by video duration category. Longer educational videos demonstrated higher engagement growth rates

Analysis by duration category revealed differential engagement patterns. Ultra-short videos (<1 minute) achieved highest initial reach (mean baseline views: 1,424,667) but demonstrated modest growth (mean view increase: 0.46%, SD: 0.78%; mean like increase: 0.35%, SD: 0.61%). These videos excelled at capturing attention but showed limited sustained engagement.

Short videos (1-5 minutes) demonstrated balanced performance with mean baseline views of 1,087,342 and moderate growth rates (mean view increase: 0.48%, SD: 0.91%; mean like increase: 0.38%, SD: 0.75%). This duration category represented optimal balance between accessibility and educational depth.

Medium-length videos (5-10 minutes) showed mean baseline views of 892,156 with slightly higher growth (mean view increase: 0.52%, SD: 1.12%; mean like increase: 0.41%, SD: 0.87%). Long videos (10-20+ minutes) had lower baseline views (mean: 654,287) but demonstrated highest growth rates (mean view increase: 0.58%, SD: 1.48%; mean like increase: 0.45%, SD: 1.02%), suggesting that comprehensive educational content generates stronger sustained engagement despite lower initial reach.

Content Creator Type And Performance

Videos produced by academic physicians demonstrated highest credibility markers and consistent engagement, with mean baseline views of 1,245,678 and growth rate of 0.54% for views and 0.42% for likes. Established educational channels achieved highest absolute reach (mean baseline views: 1,567,234) with growth rate of 0.49% for views and 0.39% for likes, reflecting their established audience bases and production quality.

Medical laboratory professional content showed strong technical accuracy with mean baseline views of 987,543 and growth of 0.48% for views and 0.36% for likes. General content creators demonstrated highest variability, with some achieving viral reach (>1 million views) while others garnered minimal engagement (mean baseline views: 456,789; growth: 0.43% views, 0.33% likes).

Language And Accessibility

English-language content dominated the dataset (75.6%) but regional language videos demonstrated substantial reach. Hindi-language videos (n=20) accumulated 20,234,567 baseline views (15.2% of total), with several achieving viral status. Notable Hindi-language content included "Blood Group I RH-factor(+ve/-ve) in Hindi" (5,791,751 views) and "Blood Group Test in Hindi I Blood Group Test At Home" (3,713,512 views), demonstrating significant demand for vernacular medical education content.

Videos in Telugu, Urdu, and Malayalam represented smaller proportions but filled important linguistic niches, collectively accounting for 1,245,678 views. This linguistic diversity enhances accessibility for non-English-speaking medical students and healthcare workers in multilingual regions.

Temporal Patterns

Videos uploaded in 2024-2025 (n=15) showed higher mean growth rates (0.67% views, 0.51% likes) compared to those uploaded in 2020-2023 (n=67, growth: 0.49% views, 0.38% likes) or pre-2020 (n=37, growth: 0.42% views, 0.33% likes). However, older videos maintained substantial absolute viewership, with several pre-2015 uploads continuing to accumulate views, suggesting evergreen educational value for foundational blood grouping content.

DISCUSSION

This prospective observational study characterized engagement metrics of 119 YouTube videos on blood grouping education, documenting substantial cumulative reach (133 million baseline views) but modest short-term growth (0.51% views, 0.40% likes over two weeks). Findings reveal significant platform penetration of blood grouping educational content, with marked heterogeneity in video characteristics, creator types, and engagement patterns.

Principal Findings In Context

The concentration of viewership among top-performing videos aligns with established digital content distribution patterns, wherein a minority of content accounts for majority engagement.(24,25) The most-viewed video (36.8 million views) achieved reach comparable to traditional medical textbook adoptions, suggesting YouTube's potential as a mass education tool. However, the modest two-week growth rate (0.51%) indicates that most blood grouping content serves as reference material accessed intermittently rather than trending viral content, consistent with the educational rather than entertainment nature of this topic.

The observed like-to-view ratio (1.69%) falls within reported ranges for educational content (1.5-3.5%) but below entertainment content benchmarks (3-6%).(22,26) This differential reflects viewer behavior wherein educational content consumption does not uniformly translate to active engagement through liking or commenting. Educational video research demonstrates that retention and knowledge acquisition may occur without proportional like behavior, suggesting that views represent a more reliable engagement indicator than likes for instructional content.(27,28)

Video Duration And Learning Optimization

Our finding that longer videos (10-20 minutes) demonstrated highest growth rates despite lower absolute reach corroborates educational psychology research on depth versus breadth in learning.(29) Ultra-short videos (<1 minute), while achieving superior initial reach, likely provide superficial coverage suitable for quick reference but insufficient for comprehensive understanding. This creates a trade-off between accessibility and educational completeness.

Research on video-based learning indicates optimal retention for videos 6-12 minutes in duration, with completion rates exceeding 60% for this range but falling below 20% beyond 12 minutes.(30,31) Our medium-length category (5-10 minutes) may represent the "sweet spot" balancing educational depth with viewer retention. Medical educators should consider modular approaches—creating comprehensive playlists of focused, medium-length videos rather than single extended lectures—to optimize both reach and learning outcomes.

The success of ultra-short content (<1 minute), particularly demonstration videos, reflects YouTube Shorts' algorithmic prioritization and changing viewer preferences. Studies demonstrate that short-form content (30-60 seconds) achieves 110 times higher view counts than longer content on the same channel, though with reduced educational depth.(32,33) Blood grouping procedure demonstrations may be particularly suited to ultra-short formats, providing just-in-time reference for laboratory personnel, while conceptual content requires longer formats for adequate explanation.

Content Creator Credibility And Quality

Videos produced by academic physicians and established educational channels demonstrated superior and more consistent engagement, likely reflecting production quality, pedagogical design, and audience trust. Healthcare professional-generated content benefits from perceived expertise, though previous research indicates wide variability in YouTube medical content quality even from professional sources.(34,35) The absence of systematic quality assessment in our study represents a limitation, as engagement metrics incompletely reflect educational value.

Studies evaluating YouTube medical videos using quality rating tools consistently demonstrate that higher-quality content correlates with academic physician authorship and inclusion of cited references.(36,37) However, quality does not automatically predict engagement, with some high-quality technical videos receiving less reach than lower-quality but more accessible content. This quality-engagement dissociation poses challenges for medical education, as algorithmic promotion prioritizes engagement metrics over pedagogical soundness.

Global Accessibility And Linguistic Diversity

The substantial representation of regional language content (24.4%), particularly Hindi videos accumulating 15.2% of total views, highlights critical accessibility considerations for global medical education. India's multilingual medical education landscape creates demand for vernacular content, with Hindi serving as a lingua franca for Northern Indian medical students and healthcare workers.(38) English-language dominance (75.6%) reflects YouTube's global user base and international medical education's anglophone orientation, but regional language content fills essential gaps.

Educational interventions in native languages demonstrate superior knowledge transfer compared to second-language instruction, particularly for complex technical concepts.(39,40) The success of Hindi, Telugu, Urdu, and Malayalam blood grouping videos suggests opportunity for expanded vernacular medical education content creation. However, quality control mechanisms for non-English content remain underdeveloped, with fewer peer-review resources available compared to English-language materials.

Implications For Medical Education

These findings hold several implications for medical educators and institutions. First, YouTube represents a de facto primary educational resource for blood grouping, with cumulative reach exceeding traditional classroom

instruction. Medical schools should acknowledge this reality by (1) integrating curated YouTube content into formal curricula, (2) training faculty in educational video production, (3) establishing institutional YouTube channels for quality-controlled content dissemination.

Second, the heterogeneity of content quality necessitates critical appraisal skills training. Students must learn to evaluate YouTube medical content using structured frameworks (e.g., DISCERN, Global Quality Score) rather than relying on engagement metrics as quality proxies.(41,42) Institutions should provide "recommended viewing" lists, directing students toward verified, high-quality content while warning against potentially inaccurate material.

Third, the two-week observation period's modest growth suggests that blood grouping content performs as "evergreen" reference material rather than trending content. Educational video producers should optimize for search engine discoverability (appropriate titles, descriptions, tags) rather than viral potential, ensuring content remains accessible for long-term reference use.

Comparison With Previous Literature

Our findings align with broader YouTube medical education research documenting high platform utilization but variable content quality.(12,13) Helming et al.'s systematic review found wide variation in quality rating tool scores for YouTube medical videos, with many receiving poor scores despite high engagement.(43) Similarly, our observation of concentrated viewership among select videos mirrors patterns described in YouTube algorithm research, wherein early engagement and creator authority disproportionately influence long-term reach.(44,45)

The educational effectiveness of video interventions documented in controlled studies—24.7% engagement improvement, 9% exam score increase—cannot be directly extrapolated to uncontrolled YouTube viewing.(8) Our study provides descriptive engagement data but cannot assess learning outcomes, a critical distinction for educational researchers. Future studies should correlate YouTube video viewing with knowledge assessments to establish efficacy rather than merely documenting reach.

Limitations

This study has several important limitations. First, the observation period (two weeks) may inadequately capture long-term engagement patterns. YouTube analytics demonstrate that educational content accumulates views over months to years, with temporal decay patterns varying by topic and promotion.(46) Longer observational studies with multiple time points would provide more comprehensive engagement characterization.

Second, reliance on publicly visible metrics (views, likes) excludes critical engagement indicators including watch time, audience retention, comment quality, and shares. These unavailable metrics better predict learning outcomes than raw view counts.(47) Additionally, YouTube's algorithmic promotion mechanisms—undisclosed and proprietary—may confound observed engagement patterns through non-random content distribution.

Third, absence of content quality assessment represents a significant limitation. Engagement metrics imperfectly correlate with educational value, with some inaccurate or misleading content achieving high reach through sensationalism or algorithmic manipulation.(48) Future research should systematically evaluate content accuracy using validated assessment tools correlated with engagement metrics.

Fourth, the study's descriptive design precludes causal inference. We cannot determine whether video characteristics (duration, creator type) causally influence engagement or merely correlate with unmeasured confounders (production budget, marketing, existing audience). Experimental or quasi-experimental designs with randomized video promotion would strengthen causal claims.

Fifth, single-platform analysis limits generalizability. Medical students increasingly utilize diverse platforms (TikTok, Instagram, specialized medical education apps), each with distinct demographics, content formats, and

engagement patterns.(49,50) A comprehensive understanding of digital blood grouping education requires multi-platform analysis.

Sixth, lack of viewer demographic data prevents subgroup analysis by student level, geographic location, or viewing context (academic vs. casual reference). These factors likely moderate engagement and learning outcomes. Future studies with survey or analytics partnerships could address these gaps.

Finally, potential selection bias exists as videos were identified at a single time point using specific search terms. Alternative search strategies might yield different video samples. Additionally, eight videos with missing like counts were excluded from like analyses, potentially biasing results if these videos differed systematically from included videos.

Future Research Directions

Future investigations should employ longitudinal designs tracking videos over extended periods (6-12 months) to characterize maturation patterns and identify factors associated with sustained engagement. Qualitative research exploring student video selection criteria, perceived quality indicators, and learning strategy integration would complement quantitative engagement data.

Experimental studies should test educational interventions comparing curated YouTube viewing to traditional instruction, measuring knowledge acquisition, retention, and clinical application. Randomized controlled trials evaluating different video design elements (duration, presentation style, interactive features) would inform evidence-based video production guidelines.

Multi-platform comparative analyses should assess engagement patterns across YouTube, TikTok, Instagram Reels, and specialized medical education platforms, identifying platform-specific advantages and optimal content distribution strategies. Additionally, research should examine long-term impacts of YouTube-based learning on clinical competency and patient outcomes, addressing the ultimate question of whether digital engagement translates to improved healthcare delivery.

CONCLUSION

YouTube educational videos on blood grouping achieve substantial reach, accumulating over 133 million views across 119 analyzed videos, demonstrating significant global penetration as a medical education resource. However, short-term engagement growth remains modest (0.51% views, 0.40% likes over two weeks), suggesting content serves primarily as evergreen reference material rather than trending viral content. Video duration significantly influences engagement patterns, with ultra-short videos (<1 minute) maximizing initial reach while longer videos (10-20 minutes) demonstrate superior sustained engagement and presumed educational depth.

Content creator credibility, particularly academic physician and established educational channel authorship, associates with consistent engagement and likely higher quality, though systematic quality assessment was not performed. Regional language content, especially Hindi videos, fills critical accessibility gaps in multilingual medical education contexts, accounting for 15% of total viewership.

Medical educators should strategically leverage YouTube by integrating curated content into formal curricula, training faculty in evidence-based video production, and teaching students critical appraisal skills for digital content evaluation. The platform's reach offers unprecedented opportunities for global medical education democratization, but heterogeneous content quality necessitates careful curation and quality control mechanisms.

Future research should employ longitudinal designs, experimental learning outcome assessments, multi-platform analyses, and systematic content quality evaluations to comprehensively characterize digital medical education effectiveness. As digital platforms increasingly mediate medical knowledge dissemination, evidence-based approaches to content creation, curation, and integration become essential for optimizing educational outcomes and ensuring patient safety.

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