

## **Original Research Article**

# **Exploring the Content and Claims of Oral Dietary Supplement Postings on Instagram: A Cross-Sectional Analysis**

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## **ABSTRACT**

Oral dietary supplements (ODS) are widely promoted on social media, but little is known about how they are presented in informal or user-generated Instagram postings. This study aimed to analyse the types of information and claims shared in Instagram posts related to ODS, focusing on ingredients, claimed benefits, safety information, usage instructions, and marketing strategies. A descriptive cross-sectional content analysis was conducted on Instagram posts identified using the hashtag #supplementmalaysia. The first 300 publicly available posts were screened using predefined inclusion and exclusion criteria, yielding 23 unique ODS products. Each post was analysed using a structured data extraction form to identify ingredient types, claimed benefits, safety disclosures, and marketing techniques. Minerals, herbs, and fibres were the most common ingredients (each 43.48%). Many posts included disease-related claims such as diabetes (21.74%) and heart disease (17.39%), while 73.91% promoted beauty enhancement, and 65.22% performance improvement. Only 26.09% included precautionary statements and 4.35% mentioned side effects, highlighting limited safety information. More than three-quarters (78.26%) presented the product as an easy solution to multiple health problems, often using testimonials and emotional imagery as persuasive tools. In conclusion, many Instagram posts promoting ODS frequently contain health and aesthetic claims with minimal safety information, relying heavily on persuasive and emotive marketing strategies. These findings underscore the need for stronger content regulation, improved public digital health literacy, and enhanced oversight of ODS promotion on social media platforms.

**Keywords:** Oral dietary supplements, Instagram, Health claims, Content analysis, Social media marketing, Digital health communication

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## 1.0 Introduction

Oral dietary supplements (ODS) are widely consumed globally, often promoted with claims to enhance health, beauty, immunity, or performance (1, 2). The ODS market has expanded rapidly in recent years, driven by rising health consciousness, lifestyle changes, and post-pandemic wellness trends (3). Parallel to this growth, the increasing availability of ODS through online retail platforms has further broadened consumer access and purchasing convenience (4, 5). At the same time, social media has become a dominant channel for promoting health-related products, where influencer-led and user-generated content shape public perceptions of product safety and efficacy. These promotions often rely on visually persuasive imagery and personal testimonials rather than verifiable scientific evidence (4).

Within this evolving digital landscape, Instagram has become a highly influential platform for ODS marketing because of its visual-centric format and extensive use of influencers (6, 7). The platform's visual emphasis facilitates the widespread dissemination of lifestyle-oriented product messages that can bypass conventional regulatory oversight. Consequently, growing concerns have been raised about the accuracy, transparency, and ethical integrity of health-related claims conveyed in such posts (6).

Prior research has explored how ODS are represented in digital media platforms (6, 7). Content analyses of product websites and packaging revealed predominantly benefit-oriented claims, often lacking safety information or scientific substantiation (8-10). More recent investigations suggest that social media fosters informal narratives about supplement use, often shaped by visually appealing imagery and emotive language rather than evidence-based information (11,

12). However, much of this research has either focused on consumer behaviour (13, 14), legal-policy analysis (15), or platforms other than Instagram (e.g., Twitter or websites) (10).

Within Southeast Asia, ODS promotion frequently reflects sociocultural and religious cues that shape consumer trust and product acceptance. Studies in Thailand, Indonesia, and Malaysia document the recurrent use of claims such as “halal,” “natural,” and “chemical-free” to build credibility and align with prevailing health beliefs (5, 16, 17). These marketing strategies often intertwine traditional wellness values with contemporary visual aesthetics, creating hybrid narratives that reinforce perceptions of safety and efficacy. In Malaysia, online ODS advertising has been observed to blur therapeutic, cosmetic, and wellness boundaries, with inconsistent safety disclosures and limited regulatory transparency (10, 17, 18).

At the global level, public-health agencies and regulatory authorities have expressed growing concern about misinformation and unverified health claims in digital marketing. Social-media platforms have become prominent channels for disseminating incomplete or misleading health information, including promotional content for ODS (5, 6, 9). These materials often portray products as inherently safe, natural, or clinically effective despite limited empirical validation, undermining consumer protection mechanisms and public trust. This escalating issue underscores the need for platform-specific investigations that characterise message framing, persuasive marketing strategies, and the visibility of safety information to inform evidence-based digital-health regulation.

A clear empirical gap remains in understanding Instagram-based ODS postings, especially in terms of the types of

health-related claims presented, the visibility and completeness of safety and usage information, and the persuasive strategies employed (4). Given Instagram's substantial influence among younger demographics and its dual role as both a commercial and informational platform (6), understanding how ODS are portrayed on this platform is essential for identifying potential risks to public health communication, digital health literacy, and consumer protection.

The primary objective of this study was to systematically analyse the content of Instagram posts promoting ODS in Malaysia, focusing on the nature and extent of ingredient disclosures, health claims, safety information, and usage instructions. The secondary objectives were to (1) identify the types of marketing and persuasive strategies used in these posts, and (2) explore potential informational gaps or regulatory concerns arising from the presentation of ODS content on this platform.

## 2.0 Materials and Methods

### 2.1 Study design

This study employed a descriptive cross-sectional design to identify ODS postings on Instagram and to examine the content and claims presented within these postings. A purposive sampling approach was used to select relevant postings from publicly accessible content that met predefined inclusion criteria. As the study involved a secondary analysis of publicly available data without the inclusion of human subjects or identifiable personal information, ethical approval was not required, in accordance with institutional research ethics policies. All analysed posts were publicly accessible and contained no identifiable personal data. No direct interactions were made with users, thereby ensuring compliance with

institutional and international ethical standards for internet-based research.

### 2.2 Inclusion and exclusion criteria

Postings were included if they featured a text-based promotional message, were published in either Malay or English, and promoted ODS products originating from Malaysia. Posts were excluded if they primarily used video content (e.g., demonstrations, skits, conversations, or testimonials), or were presented in languages other than Malay or English. In addition, postings that conveyed only factual information about ingredients (e.g., the general benefits of vitamin C or zinc) without promoting a specific ODS product were also excluded. Video-based content such as reels, testimonials, and demonstrations was excluded to maintain consistency in data extraction and to enable systematic content analysis of static image and text-based materials. Image-only posts, such as pictures of product bottles or packaging without accompanying promotional text, were excluded because they did not contain explicit claims or information that could be systematically analysed.

### 2.3 Sampling strategy

The hashtag #supplementmalaysia was used to identify relevant ODS-related postings on Instagram. This hashtag was selected following a preliminary review of multiple related tags (e.g., #malaysiasupplement, #vitaminmalaysia, #healthsupplement), as it yielded the highest number of relevant posts originating from Malaysian users. It therefore provided a focused and contextually appropriate dataset aligned with the study's objective to explore locally promoted ODS content. The first 300 publicly accessible posts were initially screened against the

predefined inclusion and exclusion criteria to determine eligibility. Only posts that fulfilled these criteria were included in the final dataset for analysis. Each post was reviewed to determine the specific ODS product being promoted. Posts featuring the same product were grouped under a single product entry to avoid duplication.

This approach resulted in the identification of 23 unique ODS products. Grouping multiple posts under each identified product ensured non-redundancy, enhanced analytic depth, and allowed a focused examination of message characteristics across the most frequently advertised ODS on Instagram. Screening the first 300 posts was considered sufficient to capture the most prominently promoted products during the study period, thereby reflecting real-world marketing trends on the platform.

Although the number of unique ODS products analysed ( $n = 23$ ) may appear modest, this size was determined by the application of strict inclusion and exclusion criteria to 300 screened posts and reflects the point of thematic saturation for the most actively promoted products within the selected hashtag during the study period. In content analysis, adequacy is guided by informational richness and representativeness rather than numerical magnitude.

#### *2.4 Postings Assessment*

Eligible postings were compiled by the primary researcher (ZAZA), with each post copied and saved in Portable Document Format (PDF) to ensure consistent documentation. A standardised data extraction form was developed by the research team to systematically collect relevant information for each identified ODS product (Supplementary File 1). The form

was validated through iterative team consultation and pilot testing on a subset of ten Instagram posts to ensure clarity, completeness, and consistency in data capture before full data extraction. All extracted data were subsequently reviewed and verified by another researcher (MSAW) to ensure accuracy, completeness, and consistency in coding.

The data extraction form was designed to capture several key elements from the postings of each ODS product. These included:

1. The ingredients listed in the product.
2. The health conditions or diseases the product claimed to address.
3. Functional and health-related claims.
4. Purported benefits and usage instructions, including dosage recommendations and administration guidelines.
5. Safety-related information, such as precautions, contraindications, and potential side effects.
6. Marketing claims, including claims of novelty, the use of testimonials, and persuasive messaging that emphasised consequences of non-use. This category also captured assertions about the product's natural origin or safety profile, such as "100% natural" or "no side effects."

This structured approach ensured a consistent and comprehensive evaluation of the content and messaging presented in the postings.

#### *2.5 Statistical Analysis*

Descriptive data analysis was performed using IBM SPSS Statistics version 24 (IBM Corp., Armonk, NY, USA). The extracted

data were summarised using frequencies and percentages to describe the distribution of informational characteristics presented in the ODS postings.

### 3.0 Results

Of the 300 Instagram posts reviewed, the majority did not meet the inclusion criteria. A total of 23 unique ODS products were identified, each featured across multiple posts.

#### 3.1 Distribution of Ingredient Types Among ODS Postings

The ingredient composition of the identified ODS products is summarised in Table 1. The most frequently reported ingredient categories were minerals (n = 10, 43.48%), herbs (n = 10, 43.48%), and fibres (n = 10, 43.48%). Vitamins were present in 6 products (26.09%), while amino acids were found in 5 products (21.74%).

Other ingredient categories included carbohydrates, fish oil, and collagen, each reported in 2 products (8.70%), and probiotics, which appeared in 1 product (4.35%). In three cases (13.04%), the specific ingredients were not clearly indicated in the posting content.

#### 3.2 Health Conditions or Diseases Claimed to Be Addressed by the Products

The analysis showed that many ODS products made explicit claims about their ability to address specific health conditions or diseases, as summarised in Table 2. The most frequently cited condition was diabetes (n = 5, 21.74%), followed by cardiovascular disease (n = 4, 17.39%) and constipation (n = 4, 17.39%).

**Table 1:** Distribution of ingredient types among ODS postings (n = 23).

Category of Ingredient	n (%)
Minerals	10 (43.48)
Herbs	10 (43.48)
Fibres	10 (43.48)
Vitamin	6 (26.09)
Amino acid	5 (21.74)
Not specified	3 (13.04)
Carbohydrates	2 (8.70)
Fish oil	2 (8.70)
Collagen	2 (8.70)
Probiotic	1 (4.35)

*Note:* The total does not sum to 23 or 100% as individual products may contain multiple ingredients

Other conditions included depression and anxiety (n = 2, 8.70%), menopause (n = 2, 8.70%), and fertility issues (n = 2, 8.70%). Several additional conditions were mentioned less frequently, each cited in only one product (n = 1, 4.35%). These included cancer, anorexia, eczema, insomnia, jaundice, attention deficit hyperactivity disorder (ADHD), autism, dyslexia, and osteoporosis.

#### 3.3 Claimed Benefits in Postings

As summarised in Table 3, a wide range of benefits were claimed in the analysed ODS postings. The most frequently cited benefit was the promotion of beauty (n = 17, 73.91%), followed by improved daily performance (n = 15, 65.22%). Claims related to cognitive and restorative functions (e.g., enhanced memory, sleep quality, and rest) were observed in 9 postings (39.13%). An equal proportion of products promoted benefits for bone, muscle, and joint health (n = 9, 39.13%).

**Table 2:** Health conditions or diseases claimed to be addressed by the products (n = 23).

Condition/Disease	n (%)
Diabetes	5 (21.74)
Cardiovascular disease	4 (17.39)
Constipation	4 (17.39)
Depression and anxiety	2 (8.70)
Menopause	2 (8.70)
Fertility	2 (8.70)
Cancer	1 (4.35)
Anorexia	1 (4.35)
Eczema	1 (4.35)
Insomnia	1 (4.35)
Jaundice	1 (4.35)
Attention-deficit hyperactivity disorder (ADHD)	1 (4.35)
Autism	1 (4.35)
Dyslexia	1 (4.35)
Osteoporosis	1 (4.35)

*Note: Totals exceed 23 and percentages do not sum to 100% as individual products were often promoted for multiple health conditions.*

Other commonly cited benefits included immune system support (n = 8, 34.78%) and antioxidant properties (n = 7, 30.43%). Less frequently mentioned claims involved weight loss (n = 5, 21.74%), menstrual pain reduction (n = 3, 13.04%), sexual health support (n = 3, 13.04%), and cholesterol level reduction (n = 3, 13.04%).

### 3.4 Purported Benefits and Usage Instructions in Postings

As summarised in Table 4, the majority of ODS postings included general claims regarding product effectiveness. Specifically, 19 postings (82.61%) asserted that the product was effective in delivering its intended benefits. Additionally, over half (n = 12, 52.17%) provided simplified explanations of how the functional

ingredients work within the human body, often using non-technical language to support these claims.

**Table 3:** Claimed benefits in postings (n = 23).

Claimed Benefit	n (%)
Promotes beauty	17 (73.91)
Improves daily performance	15 (65.22)
Improves memory, sleep, and rest	9 (39.13)
Improves bone, muscle, and joint health	9 (39.13)
Boosts the immune system	8 (34.78)
Antioxidant properties	7 (30.43)
Promotes weight loss	5 (21.74)
Reduces menstrual pain	3 (13.04)
Aids in sexual health	3 (13.04)
Reduces cholesterol level	3 (13.04)

*Note: Postings may include multiple claimed benefits; totals exceed 100%.*

In terms of usage instructions, two-thirds of postings (n = 15, 65.22%) emphasised the importance of daily use, while nearly half (n = 11, 47.83%) included specific dosage recommendations. However, the level of detail varied; some postings offered only broad guidance without precise administration instructions.

**Table 4:** Purported benefits and usage instructions in postings (n = 23).

Category	n (%)
<b>Purported Benefits</b>	
Claims of product effectiveness	19 (82.61)
Explanation of how functional ingredients work	12 (52.17)
<b>Usage Instructions</b>	
Emphasis on daily use	15 (65.22)
Daily dosage recommendation provided	11 (47.83)

*Note: Postings may contain more than one type of benefit or instruction; totals exceed 100%.*

### 3.5 Safety-Related Information Provided in Postings

Safety-related information was inconsistently presented across the ODS postings, as shown in Table 5. Fewer than one-third of the postings included precautionary statements ( $n = 6$ , 26.09%), and even fewer mentioned contraindications ( $n = 3$ , 13.04%) or potential interactions with other substances ( $n = 2$ , 8.70%). Only one posting explicitly referenced possible side effects ( $n = 1$ , 4.35%).

Advice on seeking professional healthcare guidance was also limited. Only three postings ( $n = 3$ , 13.04%) advised consumers to consult a doctor if the product was not effective.

**Table 5:** Safety-related information provided in postings ( $n = 23$ ).

Type of Safety Information	n (%)
Precautions	6 (26.09)
Contraindications	3 (13.04)
Potential interactions	2 (8.70)
Mention of side effects	1 (4.35)
Advice to seek medical attention if ineffective	3 (13.04)

*Note: Postings may contain more than one type of safety-related information; totals exceed 100%.*

### 3.6 Marketing Strategies Used in Postings

A variety of marketing strategies were employed in the ODS postings, many of which relied on testimonial-based and persuasive messaging techniques (Table 6). More than half of the postings included WhatsApp chat screenshots ( $n = 13$ , 56.52%) and consumer reviews ( $n = 10$ , 43.48%) to build credibility through user testimony. A smaller number referenced Shopee comments ( $n = 1$ , 4.35%) as an additional form of user feedback.

Claims highlighting product uniqueness or safety were less common. Only one posting explicitly described the product as novel ( $n = 1$ , 4.35%), while three postings claimed the product to be “100% natural” or free from side effects ( $n = 3$ , 13.04%).

Persuasive messaging that emphasised the negative consequences of not using the product appeared in several postings. These included warnings that disease could occur ( $n = 4$ , 17.39%) or that abnormal medical test results might follow ( $n = 1$ , 4.35%). In addition, more than half of the postings ( $n = 14$ , 60.87%) suggested that a single product could resolve multiple health issues, while over three-quarters ( $n = 18$ , 78.26%) implied that the product offered an easy solution to complex health problems.

Visual marketing strategies were also common. Non-verbal imagery (e.g., smiling faces or lifestyle visuals symbolising happiness, success, or improved well-being) was used in 13 postings (56.52%).

**Table 6:** Marketing strategies used in postings ( $n = 23$ ).

Marketing Strategy	n (%)
<i>Use of testimonials</i>	
• WhatsApp chat screenshots	13 (56.52)
• Consumer reviews	10 (43.48)
• Shopee comments	1 (4.35)
Claim that the product is novel	1 (4.35)
Claim of “100% natural” or “no side effects”	3 (13.04)
<i>Messages emphasizing the consequences of not using the product</i>	
• Disease would occur	4 (17.39)
• Abnormal medical test result would occur	1 (4.35)
Suggestion that one product solves multiple problems	14 (60.87)
Suggestion that the product offers an easy solution to health issues	18 (78.26)
Use of non-verbal imagery to portray happiness/success	13 (56.52)

*Note: Postings may employ multiple strategies; totals exceed 100%.*

#### 4.0 Discussion

This study examined the content and claims of ODS postings on Instagram, focusing on ingredient types, health-related assertions, usage instructions, safety information, and marketing strategies. The findings provide insight into how health products are promoted in largely unregulated digital environments, with implications for consumer protection and regulatory oversight.

Minerals, herbs, and fibres were identified as the most frequently featured ingredients in ODS products. This pattern is consistent with findings from previous studies conducted in Thailand and Indonesia, where herbs, vitamins, and minerals were predominant in both web-based and social media supplement content (9, 13). For instance, Chaiwchan *et al.* (2019) (9) reported that 90% of analysed web articles mentioned vitamins, 88.75% included herbs, and 85% referred to minerals. Similarly, Arumsari *et al.* (2021) (13) found that vitamin C, herbs, and iron were among the most frequently consumed supplements among Indonesian social media users during the COVID-19 pandemic. However, in contrast to the structured nature of website content, where ingredient disclosures were nearly universal (9), this study found that 13.04% of Instagram posts failed to specify the product's ingredients. This lack of transparency may be attributed to the informal and visually driven nature of Instagram, where brevity and aesthetic appeal often take precedence over regulatory completeness.

The findings also revealed that many Instagram posts linked ODS use to specific diseases, including diabetes (21.74%), cardiovascular disease (17.39%), and constipation (17.39%). These direct health claims mirror trends observed in Thai e-

marketplaces, where Inthong *et al.* (2024) (5) documented unapproved disease prevention claims in about 30% of product pages. While platforms such as Japanese newspapers often avoided explicit disease references due to regulatory constraints (19), Instagram posts in the present study appeared largely unregulated, with some referencing psychiatric, developmental, and oncological conditions. The inclusion of claims related to ADHD, autism, cancer, and osteoporosis reflects a concerning expansion in the scope of ODS advertising, possibly driven by limited content moderation and heightened consumer engagement with wellness narratives on Instagram. This broad and unregulated application of health claims surpasses the narrower focus observed on traditional platforms and highlights the unique regulatory challenges posed by social media advertising.

Aesthetic enhancement and performance improvement were among the most frequently promoted benefits, with 73.91% of products claiming to enhance beauty and 65.22% asserting improvements in daily performance. These findings correspond with patterns observed in Kuwait, where a notable proportion of university students reported using dietary supplements for physical or appearance-related reasons, including 31.2% of female students and 18.8% of male students who cited physical improvement as a key motivation (12). Similar patterns were documented in Japan, where Iye *et al.* (2021) (20) found widespread use of fat-reduction and body image appeals in ODS video advertisements. However, the current study identified a trend wherein single products claimed multiple and diverse health benefits—cosmetic, metabolic, cognitive, and sexual. This approach, less frequently documented in earlier studies, suggests a shift towards multipurpose branding strategies that conflate lifestyle and medicalised health



narratives, thereby potentially increasing consumer vulnerability through compounded persuasive appeal.

Despite the prominence of benefit-related claims, fewer than half of the Instagram posts provided essential use-related information, with only 47.83% specifying dosage instructions and 52.17% offering simplified explanations of the purported mechanism of action. This pattern differs sharply from website-based analyses, which consistently demonstrate high levels of informational completeness, including near-universal provision of usage guidance and prominent reporting of regulatory quality markers such as Good Manufacturing Practice (GMP) and Food and Drug Administration (FDA) certification. Evidence from product-packaging research similarly shows that regulatory cues are frequently incorporated to strengthen perceived product credibility. These observations highlight a clear divergence between the structured, compliance-oriented presentation typical of website and packaging content and the comparatively unregulated, visually driven format observed in Instagram-based promotions (9, 21).

The relative lack of instructional clarity in Instagram posts indicates a prioritisation of persuasive messaging over informed use, which may lead to inappropriate or unsafe consumption practices. Moreover, unlike Japanese newspaper advertisements that employed suggestive language to avoid regulatory violations (19), the Instagram posts analysed in this study frequently made bold and unqualified efficacy claims, underscoring a regulatory gap that enables unverified direct-to-consumer messaging.

Safety-related information was notably scarce. Only 26.09% of posts included precautionary statements, 13.04% mentioned contraindications, and just 4.35% acknowledged potential side effects. These

findings echo concerns raised in studies from the United States and Serbia, where safety warnings were often absent or de-emphasised. Klein and Schweikart (15) highlighted the tendency for influencer-based supplement promotions to obscure safety information, exploiting the blurred boundaries between personal opinion and commercial endorsement. Similarly, Bjelica *et al.* (2020) (8) reported that only 1.75% of omega-3 supplement websites disclosed adverse effects. The limited inclusion of safety information in the Instagram posts examined here is especially concerning given the often-aggressive health claims made, and it raises significant questions about consumer risk, particularly in the context of chronic or sensitive health conditions.

The marketing strategies observed in this study combined testimonial-based persuasion, fear-based appeals, and emotionally evocative imagery. More than half of the posts featured WhatsApp chat screenshots or consumer reviews to simulate peer endorsement, while 78.26% promoted the product as an easy solution to complex health issues. These findings align with those of Sornrabeab *et al.* (2019) (22), who described similar persuasive strategies (e.g., tailored messaging, emotional framing, and visual storytelling) within the Differentiation, Reinforcement, Information, and Persuasion (DRIP) marketing framework in Thai dietary supplement advertising. Likewise, McGloin and Eslami (2015) (23) emphasised the use of narrative, gamification, and visually compelling content to influence dietary behaviour on social media. In contrast to traditional advertising, which often emphasizes product novelty or scientific validation (8, 21), Instagram-based marketing in this study relied heavily on emotional cues and social validation, reinforcing the influential role of community-

driven digital platforms in shaping consumer behaviour.

### *Strengths and Limitations*

This study offers several notable strengths. It presents a systematic examination of the content of ODS advertisements on Instagram, a platform that plays an increasingly influential role in shaping consumer health perceptions and behaviours. Using a structured coding framework, the study comprehensively assessed key domains, including ingredient composition, health-related claims, safety disclosures, usage instructions, and marketing strategies. By analysing a diverse range of claims, from aesthetic and performance-related benefits to those targeting chronic disease management, the study provides a nuanced understanding of thematic patterns in Instagram-based ODS advertising.

Nonetheless, several limitations should be considered. Of the 300 Instagram posts initially screened, only 23 unique ODS products met the inclusion criteria for analysis. This was largely due to two factors. First, a substantial portion of excluded posts consisted of video content, which was not analysed due to methodological constraints that focused on static image and text-based material. Second, many postings were repetitive, featuring multiple instances of the same ODS product. To preserve analytic clarity and avoid duplication, these were consolidated and treated as a single analytic unit. While this approach enhanced data consistency, it may have reduced the representativeness of dynamic content formats.

Alternative screening methods, such as expanding the number of hashtags or including video-based content, were not implemented to maintain methodological consistency and analytical comparability.

Broadening the hashtag scope would likely have introduced heterogeneous and non-Malaysian content, while video or story-based posts would require distinct analytical approaches (e.g., audiovisual or discourse analysis) not compatible with the text- and image-based coding framework used in this study. Therefore, the chosen screening strategy was intentionally designed to ensure analytic rigour, clarity, and replicability within the defined study scope.

Furthermore, the purposive sampling approach, based on researcher-defined inclusion criteria, may have introduced selection bias and limited the representativeness of the identified postings, thereby constraining the generalisability of the findings.

In addition, the study sample was limited to publicly accessible Instagram content collected within a specific timeframe and sociocultural context, which may limit the generalisability of findings to other settings, populations, or platforms. Moreover, the focus on ODS products originating from Malaysia may limit the generalisability of findings to the wider ODS market, which includes internationally produced or imported products commonly promoted and consumed in the country. The analysis did not incorporate audience engagement metrics, such as likes, shares, or comments, which could offer insights into the reach and influence of individual posts. Moreover, the study focused exclusively on the content characteristics of advertisements, without exploring the intentions of content creators or the perceptions and responses of consumers. Although all extracted data were reviewed and verified by another researcher to ensure accuracy and consistency, some degree of researcher subjectivity may still have influenced the interpretation of content. Although the study identified patterns suggestive of misleading or incomplete

health information, it did not assess how such content is interpreted by users or whether it influences health behaviours or decision-making.

To address these limitations, future studies should adopt mixed-method designs that combine content analysis with audience-focused research, explore advertising strategies across multiple social media platforms, and include longitudinal or experimental approaches to assess consumer understanding, trust, and behavioural outcomes. Particular attention should be directed toward video content, which remains a dominant yet underexplored modality in digital health product promotion. These efforts are essential for informing evidence-based regulatory strategies and enhancing digital health literacy among consumers.

## 5.0 Conclusion

This study examined the content of ODS postings on Instagram, revealing frequent use of unsubstantiated health claims, minimal safety disclosures, and persuasive marketing strategies, often portraying single products as solutions for diverse health conditions. Aesthetic and performance-related benefits were prominently featured, with limited guidance on appropriate use. By examining Instagram's highly visual and influencer-driven environment, this study highlights distinctive promotional patterns that may differ from traditional advertising media. The findings underscore the need for stronger regulatory oversight and transparent advertising standards to curb misleading ODS promotions on social media. Policymakers should collaborate with digital platforms to enhance content monitoring, enforce disclosure requirements, and promote digital health literacy among consumers.

## Authorship contribution statement

**ZAZA:** Data analysis, Methodology, Formal analysis, Writing—original draft. **MSS:** Methodology, Writing – review & editing. **MSAW:** Supervision, Writing – review & editing.

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## Conflict of Interest

The authors declare no conflicts of interest related to this study.

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