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Original Article

Development and Validation of the Hypertension Awareness, Exercise, and Motivation Questionnaire (HAEM-Q) Using the Delphi Technique

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Abstract

Objectives: This study presents the development of the Hypertension Awareness, Exercise, and Motivation Questionnaire (HAEM-Q) using the Delphi technique. The primary objective was to create a tool that addresses key aspects of awareness and motivation related to exercise in individuals with systemic hypertension, with the ultimate goal of enhancing the effectiveness of exercise therapy in hypertension management.

Methodology: The HAEM-Q was meticulously developed through the Delphi method, involving iterative consultations with a panel of experts. Over three rounds, these experts provided critical feedback and suggestions to refine the questionnaire, ensuring its clarity, relevance, and comprehensiveness.

Results: The final HAEM-Q questionnaire consists of two domains: Domain A (Awareness of the Effects of Exercise on Hypertension) and Domain B (Motivation for Exercise in Hypertension). Each domain includes six carefully crafted questions. In Domain A, revisions focused on refining Q1 to emphasize awareness, adjusting the options for Q2 and Q3, and expanding Q4 with two additional questions. Questions Q5 and Q6 remained unchanged. Domain B underwent similar refinements, with significant revisions including the rephrasing of Q2 to incorporate awareness about the interplay between exercise and medication and the addition of a "Not Applicable" option to Q3 for non-exercising patients. Questions Q1, Q4, Q5, and Q6 in this domain were retained as initially designed.

Conclusion: The HAEM-Q questionnaire represents a significant advancement in the management of systemic hypertension by providing a comprehensive tool to assess the interrelationships among awareness, exercise, and motivation. This instrument has the potential to improve treatment outcomes and alleviate the burden of hypertension on both patients and healthcare systems. Future studies are needed to validate its psychometric properties and evaluate its clinical utility.

Keywords: Hypertension Awareness, Systemic Hypertension, Exercise Adherence, Questionnaire Development, HAEM-Q

INTRODUCTION

Hypertension, or high blood pressure, is the leading cause of premature death globally, affecting over 12.8 million people worldwide. In 2019, the global prevalence of hypertension among individuals aged 30 to 79 years exceeded 33% [1]. Despite advancements in treatment, the management of hypertension remains a significant challenge, primarily due to poor adherence to medication and lifestyle modifications. A critical factor influencing patient adherence is their awareness of the risks associated with hypertension and cardiovascular disease [2,3]. Shockingly, only one-third of treated individuals achieve blood pressure levels under 140/90 mmHg. Moreover, 30% of adults receiving therapy for hypertension are unaware of their condition, while 40% of those with hypertension are not receiving any treatment at all [4]. These statistics underscore the need for targeted interventions to improve hypertension management outcomes [5].

Existing questionnaires often focus on general awareness of hypertension or motivation for exercise but fail to address the specific challenges faced by individuals with systemic hypertension. The complexity of managing this condition, combined with the unique barriers and facilitators related to exercise motivation, is not fully captured in current assessments [6]. Given the importance of exercise adherence and awareness for effective hypertension control, there is a pressing need for a more comprehensive tool that can identify areas where patients lack knowledge or motivation [7].

Systemic hypertension is a prevalent cardiovascular disease that poses a significant global health burden. Traditional questionnaires used in hypertensive populations have primarily focused on knowledge domains, such as dietary practices and risk factors [8]. However, these tools often overlook other critical aspects of hypertension management, including patient awareness, exercise adherence, and motivational factors. Research indicates that higher levels of awareness and motivation are associated with better blood pressure control and medication compliance. Therefore, the development of a questionnaire that comprehensively assesses these factors is crucial for improving hypertension outcomes [9].

The HAEM-Q questionnaire was designed to address these limitations by incorporating domains related to awareness and motivation toward exercise in hypertension. The questionnaire originally comprised two domains: Domain A focused on awareness of the effects of exercise on hypertension, and Domain B focused on motivation toward exercise in hypertension. Each domain initially contained five questions, but following expert feedback, each domain was expanded to include six questions. The experts provided feedback using a grading system, assessing the relevance of each item to the measured domain. The items were scored on a Likert scale ranging from 0 to 4, with higher scores indicating greater relevance and expected engagement from hypertensive patients.

By employing the Delphi method, this study aimed to create a tailored scale that could identify specific deficits in patient awareness and motivation, ultimately leading to improved strategies for managing hypertension [10-14]. The HAEM-Q represents a significant step forward in understanding and addressing the multifaceted challenges of systemic hypertension.

The Delphi method was employed to develop the HAEM-Q questionnaire, leveraging the expertise of a diverse panel of healthcare professionals. This iterative process involved multiple rounds of feedback and revision, allowing experts to reach a consensus on the most relevant and important items for inclusion. Experts specializing in exercise physiology and hypertension management were selected based on their extensive knowledge and experience in their respective fields. The Delphi process began with the creation of a preliminary questionnaire, which was reviewed and refined over three rounds. Each round incorporated the experts' suggestions, leading to the development of a more robust and comprehensive tool. The final Delphi round resulted in a refined questionnaire with modifications made in response to expert feedback.

The primary objective of this study was to develop the Hypertension Awareness, Exercise & Motivation Questionnaire (HAEM-Q), a targeted instrument designed specifically for individuals with systemic hypertension. The HAEM-Q aims to fill gaps in existing tools by focusing on key areas such as awareness of hypertension risks, exercise habits, and motivation levels, with the goal of facilitating more effective and individualized treatment strategies.

METHODOLOGY

Expert Selection: Experts were selected based on their extensive experience and specialized knowledge in the fields of exercise physiology, hypertension management, and questionnaire development. The selection criteria emphasized individuals who had published research, developed clinical guidelines, or had a decade or more of professional experience in these areas.

Expert Recruitment: Experts were recruited through direct invitations, sent via email, which included detailed information about the study's objectives and the role of the expert panel. The recruitment process ensured the inclusion of professionals from diverse geographic locations and varied clinical settings to enhance the breadth of perspectives.

Anonymity: Anonymity was maintained throughout the Delphi rounds to prevent any bias arising from dominant personalities influencing the group. Each expert submitted their responses independently, and the data was aggregated by the research team without revealing individual identities.

Panel Size and Composition: The expert panel consisted of seven members, adhering to guidelines for Delphi studies. The panel included:

- A physiotherapist specializing in exercise prescription with over ten years of experience managing hypertensive individuals.
- A community-based rehabilitation physiotherapist with a decade of experience in hypertensive patient care.
- A physician specializing in Community Medicine, bringing epidemiological expertise and a deep understanding of population health dynamics.
- Two physicians with extensive clinical experience in treating hypertensive patients.
- A general practitioner from physiotherapy with ten years of clinical experience.
- A general medical practitioner with similar experience, offering a broader clinical perspective.

Questionnaire Development: A comprehensive literature review was conducted to identify existing exercise assessment tools, knowledge questionnaires, and primary hypertension management protocols. This review informed the design of the questionnaire, ensuring it encompassed relevant measures, domains, and scales. The draft questionnaire was then developed with input from healthcare and questionnaire development experts, focusing on content validity.

Questionnaire Data: The questionnaire covered domains related to exercise, knowledge of hypertension, and patient management. The items were designed to capture essential aspects of these domains, with a balance between comprehensiveness and brevity.

Rounds: The Delphi process involved three iterative rounds. In each round, the questionnaire was revised based on feedback from the previous round. The first round involved initial assessments and suggestions from the experts. The second round focused on refining the questionnaire, incorporating suggestions, and resolving discrepancies. A third round was conducted if further revisions were needed to achieve consensus.

Meeting of Participants: Although the Delphi method typically avoids direct meetings to maintain anonymity, virtual communication tools were used to facilitate any necessary clarification during the feedback process. This ensured all experts had a clear understanding of the revisions being proposed.

Feedback Design: Feedback was systematically collected and analyzed after each round. A summary of the responses was shared with the experts in a blinded format, highlighting areas of agreement, disagreement, and any emerging themes. This iterative feedback design allowed for a progressive refinement of the questionnaire.

Stopping Criterion: The stopping criterion was predefined as achieving consensus on over 80% of the questionnaire items or reaching three rounds without significant new suggestions. This criterion ensured the process did not continue indefinitely and that the final questionnaire was both comprehensive and practical.

Duration Pretest: Before initiating the Delphi rounds, a pretest of the questionnaire was conducted with a small group of healthcare professionals outside the expert panel. This pretest helped identify any ambiguities or practical issues in the questionnaire, allowing for adjustments before the formal Delphi process began.

Data Collection: Data collection was conducted online, with each expert submitting their feedback through a secure platform. This approach ensured

timely and efficient data collection while maintaining the anonymity of the participants.

Proceeding with Items: Items from the questionnaire that achieved consensus were retained, while those that did not were either revised or removed. New items suggested by the experts were considered for inclusion if they aligned with the study's objectives.

Proceeding with Non-responders: Experts who did not respond in a given round were sent reminders and provided with additional time to submit their feedback. If nonresponse continued, their previous responses were included in the analysis, ensuring that their input was still considered.

Proceeding with the Survey Method: The Delphi survey method was carefully structured to allow for clear communication of the items and questions. Each round was spaced out to give experts sufficient time for thoughtful consideration, ensuring that the feedback was thorough and well-considered.

Methods of Data Analysis: Data analysis involved both qualitative and quantitative techniques. Thematic analysis was used to identify common themes in the feedback.

Quantitative Analysis: Quantitative methods were employed to assess consensus among experts. This involved calculating the interquartile range (IQR) to measure the degree of agreement on each questionnaire item. Items with a narrow IQR were considered to have strong consensus, while those with wider ranges indicated areas of disagreement or need for further refinement.

Qualitative Analysis: Thematic analysis was used to analyze qualitative feedback from experts. Initially, comments from Round 1 were reviewed to identify common issues and overarching themes. Feedback was coded into categories such as "Clarity Issues," "Relevance of Items," and "Content Gaps." These codes were organized into broader themes like "Questionnaire Quality" and "Domain Coverage." Themes were defined and named to ensure they accurately reflected expert feedback, guiding revisions in subsequent rounds.

The thematic analysis findings were integrated into the final report, detailing how expert feedback influenced the development of the HAEM-Q. This approach highlighted how iterative revisions, informed by both qualitative and quantitative analyses, led to a refined and validated instrument.

Dealing with Dissent: In cases where dissenting opinions persisted, these were documented and analyzed separately. The research team made concerted efforts to address the concerns raised by dissenting experts, either by revising the questionnaire items or providing a rationale for retaining them unchanged.

RESULTS

Response Rate: Throughout the Delphi study, the response rate remained consistently high across all three rounds. In Round 1, all seven experts provided their feedback, resulting in a 100% response rate. The same level of engagement was maintained in Rounds 2 and 3, with each expert actively participating, allowing for a robust consensus-building process.

Reporting Results: In Domain A, which focused on awareness of the effects of exercise on hypertension, the experts provided valuable feedback across the three rounds:

Table 1: Domain A: Awareness towards Effects of Exercise on Hypertension

Question	Round 1 Response	Round 2 Response	Round 3 Response
Q1: Awareness of health issues related to high blood pressure	Reframe question	Reframe question to focus on hypertensio n awareness	Accepted
Q2: Awareness of the effect of exercise on hypertension	Options 1 and 4 to be changed	No Change	Accepted
Q3: Challenges in exercising regularly	Simplify the question	Options 2 and 4 to be changed	Accepted
Q4: Awareness about types of exercises for hypertension	Addition of 2 more questions	No Change	Accepted
Q5: Awareness of exercise prescription by professionals	No Change	No Change	Accepted
Q6: Belief about exercise deteriorating health	Suggested by experts	No Change	Accepted

Table 2: Domain B: Motivation towards Exercise in Hypertension

Question	Round 1 Response	Round 2 Response	Round 3 Response
Q1: Frequency of physical activity for blood pressure control	No Change	No Change	Accepted
Q2: Additional benefits of exercise with medication	Options 1 and 2 to be changed	Reframe question to include awareness of exercise and medications	Accepted
Q3: Enjoyment of exercise	No Change	Add option 'Not applicable' for non-exercisers	Accepted
Q4: Satisfaction with exercise's impact on blood pressure	Addition of 2 more questions	No Change	Accepted
Q5: Regularity of exercise	No Change	No Change	Accepted
Q6: Duration of daily exercise	No Change	No Change	Accepted

Reporting the Overall Process: The overall Delphi process was marked by iterative refinement and consensus-building. In both domains, experts initially suggested several changes, particularly in Rounds 1 and 2. These changes included reframing questions, adding options to enhance clarity, and expanding the scope of the questionnaire to ensure it comprehensively addressed the topics of awareness and motivation towards exercise in hypertension.

In Domain A, the process began with five questions, to which one additional question was added at the experts' suggestion. Similarly, Domain B, which initially comprised five questions, saw the inclusion of an additional question based on expert input.

The iterative rounds allowed for thorough vetting of each question, with the experts providing critical insights into the phrasing and relevance of the questions. By Round 3, most questions had either been accepted in their revised form or had undergone further refinement to ensure they met the study's objectives.

The Delphi method proved effective in facilitating a structured dialogue among the experts, ultimately leading to the development of a well-validated questionnaire that accurately reflects the collective expertise of the panel on the topic of exercise and hypertension.

DISCUSSION

The development of the HAEM-Q questionnaire, utilizing the Delphi technique, represents a significant advancement in addressing the multifaceted nature of systemic hypertension. This discussion highlights the comprehensive approach taken in the questionnaire's development, its potential clinical impact, and directions for future research.

Comprehensive Approach: Systemic hypertension is a complex condition influenced by various factors, including motivation, exercise, and awareness. Traditional surveys often focus narrowly on specific aspects of hypertension management, such as dietary habits or medication adherence. In contrast, the HAEM-Q questionnaire adopts a more holistic approach by encompassing domains related to motivation for lifestyle changes, the impact of exercise, and awareness of hypertension risks. This comprehensive perspective is critical for designing targeted interventions tailored to the specific needs of individuals with hypertension. By addressing these interconnected factors, the HAEM-Q questionnaire provides a more nuanced tool for understanding patient behavior and guiding intervention strategies [9,15].

Expert Involvement: The validity of the HAEM-Q questionnaire was ensured through the careful selection of a diverse panel of experts, each bringing deep expertise in hypertension management and questionnaire development. The inclusion of experts from various disciplines, such as cardiorespiratory physiotherapy, community medicine, and clinical practice, provided a rich array of insights. The iterative nature of the Delphi technique allowed for the refinement of the questionnaire through successive rounds, fostering consensus and ensuring that the final version accurately reflected the breadth and depth of knowledge in the field. This iterative process was instrumental in capturing the complexity of systemic hypertension and ensuring that the HAEM-Q questionnaire is both comprehensive and relevant [16].

Clinical Implications: The HAEM-Q questionnaire has the potential to significantly impact both research and clinical practice in hypertension management. By identifying areas where patients with systemic hypertension may lack knowledge or motivation, healthcare providers can develop targeted interventions to improve treatment outcomes. For example, interventions designed to increase awareness of the risks associated with hypertension or to enhance motivation for exercise may lead to better adherence to medication and lifestyle modifications. Improved adherence, in turn, could result in better blood pressure control and a reduced risk of cardiovascular events. The HAEM-Q questionnaire, therefore, not only serves as a diagnostic tool but also as a foundation for personalized patient care [17].

Future Directions: While the HAEM-Q questionnaire is a substantial step forward in assessing awareness, exercise, and motivation in individuals with hypertension, further research is needed to validate its psychometric properties and evaluate its effectiveness in clinical settings [18]. Longitudinal studies could be conducted to assess the questionnaire's utility in predicting treatment adherence and cardiovascular outcomes over time. Additionally, the questionnaire could be adapted for use in different linguistic or cultural contexts, ensuring its applicability across diverse populations. Such studies would help to confirm the generalizability of the HAEM-Q and enhance its clinical utility.

Limitations: Despite its strengths, the HAEM-Q questionnaire has some limitations that should be acknowledged. One primary limitation is the reliance on expert opinion, which may introduce subjective bias, particularly if panel members share similar perspectives. This could lead to the exclusion of diverse viewpoints that might be crucial for a comprehensive understanding of hypertension management. Additionally, the relatively small number of experts involved in the Delphi rounds may limit the generalizability of the findings. The iterative feedback process, while beneficial for achieving consensus, could also introduce inconsistencies if experts misinterpret revisions, leading to potential imprecision in the final questionnaire.

Potential bias could also arise from the selection criteria for experts, possibly over-representing certain fields while underrepresenting others, thereby influencing the content and focus of the questionnaire. Although these biases are likely moderate, they could affect the comprehensiveness and balance of the final tool. Furthermore, while the Delphi method is effective in achieving consensus, it may inadvertently smooth over minority opinions that could be important in addressing unique challenges in hypertension management.

CONCLUSION

The development of the HAEM-Q questionnaire using the Delphi technique marks a significant advancement in the management of systemic hypertension. By thoroughly exploring the interrelated dimensions of awareness, exercise, and motivation, the HAEM-Q offers a comprehensive tool that has the potential to enhance treatment outcomes and mitigate the burden of hypertension on both patients and healthcare systems. The iterative refinement process, guided by expert input, has ensured that the questionnaire addresses key factors that influence hypertension management. However, further research is essential to validate the psychometric properties of the HAEM-Q and to assess its practical utility in diverse clinical settings. Such studies will be crucial in establishing the HAEM-Q as a reliable and effective instrument for improving hypertension care.

AUTHORS' CONTRIBUTION

GG, VCJ, MK, and DB: Concept and design, data acquisition, interpretation, drafting, final approval, and agree to be accountable for all aspects of the work. GG, VCJ, MK, and DB: Data acquisition, interpretation, drafting, final approval and agree to be accountable for all aspects of the work.

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