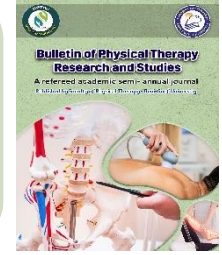




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Are Egyptian Physiotherapists Using Standardized Gait Analysis? A Cross-Sectional Survey Study

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Running Title: Importance Of Gait Assessment Among Physiotherapists

Abstract

Background: Physiotherapy is crucial for managing gait dysfunctions, but research on Egyptian physiotherapists' knowledge and training in gait assessment is limited.

Purpose: The study aims to evaluate the current gait assessment tools and training methods among Egyptian physiotherapists and determine the necessity for a clinically standardized approach.

Methods: A survey study in Egypt assessed physiotherapists' gait analysis training, frequency of using standardized tools, and perceived need for gait analysis tools in clinical settings.

Results: A survey of 330 physiotherapists revealed that despite 84.8% treating gait disorders, standardized gait assessment tools were not widely used. Only 46.4% had access to a gait laboratory. The survey also highlighted the need for training and national guidance in gait assessment.

Conclusion: These results highlight the importance of standardized gait analysis approaches, formal training, and the development of national guidelines to enhance gait assessment practices in Egypt's clinical settings.

Keywords: gait dysfunctions, gait analysis, standardized gait analysis

Introduction

The analysis of movement or gait has evolved as an effective assessment method that finds applications in clinical diagnoses, monitoring functional recovery, musculoskeletal rehabilitation, sports science, and basic biomechanical research. Initially, this approach was primarily used for treating neurological conditions such as cerebral palsy. However, over time, its benefits have become evident in other medical fields, including orthopedic technology, foot surgery, and patients with lower limb amputations. These approaches have contributed to an enhanced comprehension of specific causes of gait and movement issues, enabling a more objective and quantifiable approach to tailor patient-specific therapy (1)

The perfect handling of atypical gait is a vital component in the field of physiotherapy, specifically within pediatric and adult neurology contexts. To secure precise and dependable outcomes, it is essential to perform gait analysis in a facility possessing medical certification, one that strictly complies with elevated quality standards and thorough quality control procedures (2).

Physical therapists strive to utilize cost-effective and portable tools for gait analysis in order to promptly identify gait disorders and their associated complications. This approach enables them to

determine the most optimal and efficient therapeutic interventions for patients (3) The objective quantification of gait is essential for evaluating the efficacy of therapy. Unfortunately, the high cost and complexity of gait analysis devices limit their widespread use in clinical settings. Nevertheless, there is a significant clinical need for affordable and accessible tools that enable quantitative gait analysis (4)

The utilization of instrumented gait analysis is commonly acknowledged as the preferred method for acquiring thorough information on kinematics, kinetics, and muscle activity. Nevertheless, in ordinary clinical settings, the availability of a fully equipped gait laboratory is infrequent. In Egypt, instrumented gait laboratories are typically found in educational facilities, while the number of installations in hospitals is gradually increasing. Nonetheless, their utilization in clinical settings is still limited and not yet widespread (5).

To address the gap between instrumented gait assessment and the restricted availability of such facilities in routine clinical settings, researchers have created gait assessment tools explicitly tailored for regular use in clinical environments, eliminating the necessity for intricate instrumentation (6). Nevertheless, there is a general lack of substantial evidence affirming the credibility, consistency, sensitivity, and specificity of these gait assessment tools designed for clinical application in identifying clinically significant alterations in gait. The degree to which these tools have been embraced in the clinical practices of Egypt is still indeterminate.

Prior to initiating the creation of a new gait assessment tool for regular clinical use, researchers must evaluate the effectiveness of existing tools in meeting clinicians' needs. Preliminary research is crucial. If current tools are insufficient, it's essential to understand their limited usage, explore emerging alternatives, and identify areas for improvement. This insight aids researchers in specifying an enhanced, clinically focused gait assessment tool (5).

To examine the use of clinically oriented gait assessment tools and instrumented gait analysis by physiotherapists in Egypt's public and private hospitals, this study employed a survey to collect practice-related information. The main goal was to assess the need for a new clinically focused gait assessment tool. This involved investigating how Egyptian physiotherapists presently employ instrumented gait laboratories or clinically oriented gait assessment instruments outlined in the literature.

To aid the creation of a new tool, it's crucial to examine the challenges in routine gait assessment and explore the preferred features of a future tool. Additionally, comprehensively understanding how these issues connect to specific practice areas, staff qualifications, professional grade, and prior gait assessment training would offer valuable insights into gait assessment use in Egyptian physiotherapy.

Methods

Ethical considerations

Approval for this study was obtained from the Research Ethics Committee of the Faculty of Physiotherapy at Cairo University (approval number: P.T. REC/012/003132).

Study design and Setting

A cross-sectional study was undertaken among Egyptian physiotherapists with various specialties between January 6, 2021, and three months later. Physical therapy departments of government hospitals Moreover, the private hospitals and centers were within the scope of this study.

Inclusion criteria

Graduated physiotherapists, who finished the year of internship and have the license to practice the profession, were considered for the study.

Procedures

A well-designed online questionnaire using a Google form was sent by email to different governmental and private physical therapy departments and sent to physical therapists through their private social media profiles.

The questionnaires were distributed to 700 physiotherapists, with 330 responding before the deadline.

Based on findings from two prior investigations conducted in Ireland and the United Kingdom (UK),(5,7) By copying several of the study's questions, the questionnaire design was borrowed from Flannery and O'Sullivan's 2008 work with their permission. The information was gathered using a questionnaire with open-ended and closed-ended questions as well as a non-parametric ordinal rating scale. The authors have previously determined the original questionnaire's validity and reliability. (7)

The design of the questionnaire has the following sections(5,7)

1 (About You)

In Part 1 (About You), the grade, qualifications, age, and gender of each participant were given.

2 (Your Patients)

It was to inquire about common ailments that participants treated, whether any of the patients had gait issues, and how long the participants had worked with their patients.

3 (Gait Analysis Experience)

It was designed to collect data on gait analysis experience, including any formal gait analysis tutorial, the capacity for understanding gait laboratory results, and the degree to which such results influence clinical practice.

4 (Gait Analysis Methods)

The survey inquired about the utilization of gait analysis tools and techniques in clinical environments and assessed the accessibility of these tools in such settings.

5 (Wish List)

It was developed to gather data on the objectives of using GA tools, what an ideal might entail, the benefits of video-based assessment and its structure, the appropriate amount of time (in minutes) for a GA needed for each patient, the expenses involved, the demand for national guidelines, the essential elements of GA, as well as the specialty for which custom GAs should be developed.

The Results section includes a list of the top five answers to an open-ended question on the components of a GA tool.

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This part of the survey allowed respondents to provide personal comments on any aspect of gait evaluation and asked if there was a need for any GA tools in clinical practice.

The total number of questionnaires sent was 700, with a deadline of April 6, 2021. 330 physiotherapists responded, with a response rate of 47%.

Statistic Evaluation

The features of the individuals and the data were illustrated through descriptive statistics, specifically frequencies and percentages. The features of the subjects and patients served as independent variables. The experience with gait analysis, the tools used for GA, the capacity to do so, the wish list, and the demand for a GA tool in clinical practice were the dependent factors. The chi-squared test (also

known as Fisher exact tests) was performed to compare responses within and across categories. The significance level for all statistical tests was $p < 0.05$. The statistical package for social studies (SPSS) version 25 for Windows was used for all statistical calculations.

Results

A total of 330 valid responses were returned and analyzed, which represents 47% of the total number of questionnaires sent.

Participants' characteristics

The sex distribution of the participants showed that 48.5% were female and 51.5% were male. The participants represented three age groups: 21–30 years (36.4%), 31–40 years (39.4%), and 41–50 years (24.2%). The grades of participants included junior (12.1%), senior II (9.1%), senior I (27.3%), superintendent (3%), clinical specialist (30.3%), and extended scope practitioner (18.2%). The majority had a Bachelor of Science (B.Sc.) degree qualification (45.5%), 33.3% had a Doctor of Philosophy (Ph.D.), 12.1% had a diploma, and 9.1% had a Master of Science (M.Sc.) degree as shown in Table 1.

Patients' characteristics

Mostly physiotherapists (84.8%) of respondents dealt with patients who had gait disorders. There was no significant association between qualification and area of practice ($\chi^2 = 25.58$, $p = 0.69$). The practice area encompasses the majority of physiotherapy, with the highest frequency of pediatrics, neurology, and orthopedics practice as in Table 2.

Experience of Gait Analysis

About 42.9% of participants who were dealing with patients who had any gait disorders had received formal training in GA. There was a significant association between qualification and formal training ($\chi^2 = 12.78$, $p = 0.005$). Subjects with a B.Sc. degree and a PhD received 50% and 40% more formal training, respectively, while those with a diploma and a master's received 10% and 20% less. Clinical specialists and senior I received formal training at a 40% rate, extended scope practitioners at a 20% rate, and junior, superintendent, and senior II at a lower rate. There was a notable and statistically significant difference among all grades ($P < 0.001$). 46.4% of participants had patients visit a gait laboratory for a full GA, and 100% of them were able to understand the findings, while only 42.9% of the total participants found that the findings influenced their clinical practice.

Significant variations were observed in the utilization of gait laboratories for a complete GA across different professional grades ($\chi^2 = 99.380$, $p < 0.001$). Notably, 80% of extended scope practitioners and 100% of superintendents conducted patient assessments in a gait laboratory, indicating higher proportions than other grades. Furthermore, the use of gait laboratories for a complete GA showed significant differences based on qualifications ($\chi^2 = 36.07$, $p < 0.001$): 60% of Ph.D. holders, 50% of Diploma holders, 36.4% of B.Sc. degree holders, and 33.3% of master's degree holders had patients assessed in a gait laboratory. Interestingly, no significant association was found between the patients' group and gait experience ($p > 0.05$) as shown in Table 3.

Gait Analysis Tools

Fifty percent of participants dealing with patients with gait disorders utilized standardized GA forms, such as the Gross Motor Function Measure or Physicians Rating Scale. Visual assessment observation tools or charts were employed by 15%, while still photography and video recording were utilized by less than 7% and 8.9%, respectively, when a GA tool was not used. No significant differences were observed in the use of GA tools between professional grades and qualifications ($p > 0.05$).

29.3% informed that they did not have GA equipment available in their department. most GA tools were designated GA rooms and spaces (14.6%), digital photographic cameras (14.3%), video cameras (12.1%), and combinations of personal computers, televisions, video recorders, video cameras (8.6%), and others.

There was no tool available for the patient group (31.4%), there were budget constraints (16.8%), there was a lack of space (12.5%), and there was a lack of interest (8.2%), while 7.9% were unaware of GA tools. No tool was available for patient groups, and budget constraints were the common causes among grades. Lack of knowledge of GA tools was prevalent in both junior (45%) and diploma (25%).

The ability to analyze gait visually was rated 1 in 7.1%, 2 in 25%, 3 in 39.6%, 4 in 24.6%, and 5 in only 3.6%. Junior grade staff rated themselves 1 and 2, most clinical specialists rated themselves 3, extended scope practitioners rated themselves 3 and 4, seniors rated themselves 2 and 3, and most superintendents rated themselves 3, with a significant difference between grades ($p < 0.001$). With a significant difference in qualifications ($p < 0.001$), degree respondents rated themselves 3, diploma and MSc respondents rated themselves 2, and PhD respondents rated themselves 3 as in Table 4.

Wish lists I

The majority of participants (55.4%) choose a combination of assessing physiotherapy intervention, diagnosing gait abnormality, using the tool as a teaching tool for research, performing a baseline assessment, monitoring progress, and assisting in the development of outcome measures. Research was chosen by 12.1%, and the diagnosis of gait abnormality was chosen by 11.8%. No notable difference was observed in the utilization of GA tool concerning professional grades and qualifications ($p > 0.05$).

The visual assessment plus patient assessment form (27.1%), video assessment plus computer software (23.9%), force platform, tracking camera system, EMG, and foot pressure distribution (26.1%) were the most popular choices for what should be included in the GA tool, with no relationship to grades or qualifications ($p > 0.05$).

The significance of video-based GA was rated as 3 (38.9%), 4 (20.4%), and 5 (35.7%), indicating a widespread acknowledgment of the importance of video-based analysis. Interestingly, there was no discernible difference in the rating of the value of video assessment among different professional grades, qualifications, age groups, or genders ($p > 0.05$).

The most accepted period that should be allowed for a GA was 20–30 minutes (56.1% of respondents) and 30–40 minutes (17.1%). There was no difference between qualifications, age groups, and gender ($p > 0.05$). A large percentage of respondents (46.4%) don't know the cost of the GA tool, while 53.6% expected the cost to range from 500 to > 3000 LE as presented in Table 5.

Wish lists II

Most respondents (75%) preferred a universal GA tool for all clinical specialties. Those who disagreed with a universal GA tool for all clinical specialties believe it should be an individually designed GA for orthopedics, pediatrics, burn care, sports injuries, adult neurology (33.3%), pediatrics (16.7%), and adult neurology (16.7%).

The majority (25.7%) expressed a preference for gait analysis training at their clinical site. Following closely, 21.4% favored a university-based day course combined with clinical site training, while 17.9% opted for a university day course alone. Another 16.4% preferred a combination of clinical site training and a user manual.

There was unanimous agreement on the necessity for national guidelines concerning GA in clinical practice (100%), as well as strong support for the provision (85.7%) and protocols (85.7%) associated with GA as shown in Table 6.

The need for a GA tool for use in clinical practice

Every participant (100%) emphasized the necessity of a gait analysis (GA) tool for application in clinical practice.

Discussion

Although gait evaluation was determined to be a significant element of physiotherapists' practice in two prior survey studies conducted in the UK and Ireland, it was discovered that physiotherapists wanted more instruction and direction (5,7). The current study highlights similar important issues that physiotherapists in Egypt confront with reference to gait analysis.

Although the study's sample size was rather modest, the high response rate (47%) suggests that the findings should accurately reflect the majority of Egypt's licensed physiotherapists who work in pediatrics, orthopedics, and neurology departments both the governmental and private spheres.

Although the results may be skewed due to the lower response rate in the lymphedema, burn, and sports medicine groups, the results may still be accurate given the wide diversity of healthcare professionals involved in these three varied subspecialties in Egypt.

Experience And Training As A Physiotherapist

It was heartening to discover that 42.9% of physiotherapists had formal training, being that 84.8% of them were currently treating patients with gait issues. This is consistent with the fact that training in gait analysis has been received by 42% of physiotherapists in the UK (5), but 91% of physiotherapists in Ireland have. (7).

Due to the low number of UK therapists with diplomas who have had professional training in gait analysis (5), This could be because of a higher percentage of B.Sc. qualified therapists with diplomas who still work as junior and senior II therapists, compared to a higher percentage among those tested in Ireland who have degree qualifications and work as senior physiotherapists (7).

Due to the nature of their profession, the lesser proportion could significantly affect how well a physiotherapist's treatment approach works out. The fact that patients with gait issues were being treated by the majority of physiotherapists in all the various subspecialties emphasizes the fact that gait analysis is an essential component of treatment in many areas of physiotherapy.

Gait analysis is a crucial and ongoing part of clinical practice, as evidenced by the fact that the amount of time physiotherapists had been working with patients matched the amount of time they had been qualified. Furthermore, prior studies show that experienced observers are more trustworthy than rookie observers (8).

Although this was not looked at in the current study, The most common degree of training was undergraduate, although 45.5% said this level required extra training as well. This can be a sign that undergraduate gait analysis training and standards have not been enough. Over 60% of physiotherapists in the UK indicated a need for additional training, which was supported by more findings (5). 91% of those surveyed in Ireland shared this opinion (7).

On the whole, respondents felt reasonably confident in their ability to judge gait visually. This is in line with studies on physiotherapists conducted in the UK (5) and Canada (9). As was previously found (5), physiotherapists with formal training had greater confidence than others without formal training. Despite their expressed confidence, therapists, like those in the UK and Ireland, stated that they needed greater training and national guidance. (5,7).

Gait Assessment: Current Practice

Observational analysis was the gait evaluation technique most frequently employed by Egyptian physiotherapists, according to reports. Despite the low reliability described in the literature (10,11), this is frequent in the UK and Ireland among physiotherapists (7,12). The ease of use, lack of expense, and speed with which it can be used to determine a patient's gait pattern may be the causes of the extensive use of observational analysis, particularly in situations when access to technology is constrained (13).

Almost no therapists used additional techniques for gait analysis, despite the fact that around half of respondents claimed to have some sort of equipment at their disposal. Budgetary limitations, a lack of available space, and a lack of time were all obvious roadblocks, and the sports medicine group in particular commonly noted that they were unaware of an appropriate gait assessment tool for their patient group. These results are in line with those from Ireland and the UK (5,7).

There has been a lot of debate on visual observation gait assessment techniques, particularly within adult neurology and pediatric populations (14). Due to the unreliability of many of these instruments, even those that are trustworthy may not be valid when compared to 3D-instrumented gait analysis (15). This may account for clinicians' slow adoption of them. Current gait assessment techniques have not been developed or tested in a systematic manner; instead, they have evolved from clinical needs and actual use (5,16).

Managers and clinicians utilize gait assessment techniques most frequently, according to the literature currently in use. This is understandable given that the use of a gait assessment instrument has been associated with prior knowledge, training, and experience (17).

This connects to the necessity for additional training in gait analysis, as early education could give physiotherapists a strong foundation to raise the caliber of their gait evaluation. Although it has been suggested that video analysis can improve the therapist's observational skills by enabling repeated slower viewing and freezing frames for more in-depth analysis (10), In this poll, only a small percentage of therapists acknowledged employing video analysis as a test in routine therapy settings.

This may be due to time, resource, and financial limitations. For instance, less than 1/8 of physiotherapists had access to videos, and there were issues with consent, confidentiality, and measurement standardization (18). Those who had access to videos on-site were more likely to use them, as was to be expected.

The absence of established methods is problematic considering the likelihood benefits of video capture. The capacity to understand the significance of standardization in the value of the video data should also be included in training, as described in the literature (Reisman, 2017)(19). The variation in video data collection techniques is interesting, especially given that the sagittal plane is suggested to improve the accuracy and sensitivity of detecting gait disorders (20).

Nearly 70% of physiotherapists have referred their patients to other medical specialists for additional gait analysis. A prior study has not determined how frequently this happens. A little bit more than one-third of therapists polled in the UK (5) referred patients to instrumented gait analysis labs.

This may be related once more to the possibility that this study's primary focus was on the therapists who will likely conduct gait analysis. It is expected that pediatric therapists would refer patients to other specialists for expert assistance and to gait laboratories for instrumented gait tests because they are more likely to deal with more severe, complex gait disorders. (21).

However, a lot of other physiotherapists also asked for additional evaluation from other therapists, suggesting that There can be a lack of education and/or consistency among therapists in this field. The high referral rate can be a sign that therapists are unsure of what to focus on while examining gait, despite the fact that they report confidence in their visual observation skills. It supports research showing that there is minimal consensus among therapists on what should be assessed during observational gait; therefore, it is not unexpected that numerous researchers have observed inter- and intra-rater reliability issues (22,23).

Given that interpreting data on biomechanics can be challenging and time-consuming., it's possible that only There are hardly many physiotherapists are familiar with the results, which contributes to the hesitation to send patients to gait analysis facilities. This may also contribute to the difficulty of applying the knowledge learned in the lab to the context of therapy (24). This is disappointing because Strong evidence exists to support the claim that 3D gait motion analysis techniques are more precise and can identify more gait issues than visual observation or video analysis (25,26). At the very least, it is reassuring to know that, as previously documented (5), the results obtained in laboratories had an impact on clinical practice.

The question of whether this potential effect on patient outcomes in clinical practice would justify the high construction and operating expenses of instrumented gait laboratories is crucial (27). Therapeutic gait analysis must be done with a thorough understanding of the biomechanics of normal gait, as has already been noted (28).

It appears that the reliability of visual observation is increased if the observers have received specialized training in evaluating normal gait metrics (McGinley et al., 2003). Furthermore, it seems that even with sophisticated instrumentation, several gait cycles must be evaluated in order for the results to be considered adequately accurate (29).

Even though instrumented gait analysis is more accurate and reliable, it is possible that specialized training in gait assessment, more gait cycles, and a more uniform method might boost the accuracy of visual observation to a level that could improve patient outcomes in the clinical setting.

Perspectives And Views Of Individuals Who Surveyed

Gait, according to the Egyptian physiotherapists recruited for this study, plays a significant role in therapeutic practice. In line with research from the UK and Ireland, they think that greater training, guidance, and the creation of suitable instruments are needed. Again, in agreement with the UK and Ireland, for all patient populations, there does not seem to be a need for a standard gait evaluation tool.

Gait analysis frequency and complexity in this demographic, as identified in the UK & Ireland, may be related to the indicated need for the creation of a gait assessment instrument for the pediatric and adult neurology community. According to the literature, the main obstacles to using gait assessment instruments were a lack of funding in addition time and space restrictions (30).

An additional difficulty is that few of the physiotherapists polled appeared to be aware of the tools, even when they were available, such as the Rivermead Visual Gait Assessment (31).

Official national guidelines were strongly required on the use of GA in clinical practice (100%); the provision of gait testing and protocols for conducting GA were all strongly agreed upon (85.7%) by participants.

Limitations

Even though this survey has brought up numerous significant difficulties about gait analysis, the purpose for which the therapist is completing the GA must be taken into account.(32) There are numerous gait analysis instruments and techniques utilized by physiotherapists working in various disciplines since they may be assessing gait for various reasons or focusing on various gait components. This could be the cause of the disparity in results between specialties and could have affected overall outcomes. The results are based on a questionnaire that has not been validated but is substantially based on an existing survey with documented reliability and validity. Finally, although the survey attempted to gather a representative sample of Egyptian physiotherapists engaged in gait analysis, not all the specialties were included equally, and the small sample size might limit the statistical significance between specialties.

Study Implications

The findings might raise awareness of the need for increased precision and standardization in gait analysis. as recognized in the UK and Ireland before (5,7), Tools for accurate gait analysis are required, notably in people who have more severe gait problems. The difficulty lies in creating tools that have scientific merit while also striking the right balance between expense and user friendliness.

Physiotherapists require effective and trustworthy tools that they may utilize quickly and simply in their hectic daily schedules. Additionally, it has been determined that additional training and uniform gait standards are necessary. The best way to accomplish this goal could be to increase physiotherapists' understanding of its significance and expand their education in this area.

Conclusion

In the practice of physical therapy, gait analysis is a crucial responsibility. There is still a significant need for more formal training, even if most physiotherapists have some. Constraints on money, time, and space affect the assessment technique selection. Despite its drawbacks and the absence of national standards, visual observation is still the method that physiotherapists most frequently employ to assess gait. Even though the information they get at these locations seems valuable, physiotherapists do not frequently employ instrumented gait laboratories. Very few people who employ video analysis adhere to defined procedures. We need rapid, easy-to-use gait assessment solutions that don't compromise validity and reliability. The findings generally agree with physiotherapy research carried out in the UK and Ireland.

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