

Original Article

The clinical and demographic features of dizziness related to general health among the Saudi population

AMER AL SAIF¹⁾, SAMIRA AL SENANY^{2)*}

¹⁾ Department of Physical Therapy, Faculty of Applied Medical Sciences, King Abdulaziz University, Jeddah, Saudi Arabia

²⁾ Department of Public Health, Faculty of Nursing, King Abdulaziz University: P.O. Box 22246, Jeddah 4929, Saudi Arabia

Abstract. [Purpose] The purpose of this study was to determine the validity, demographic features of the newly developed Amer Dizziness Diagnostic Scale (ADDS), provide differential diagnosis of the vestibular disorders, assist in the clinical research and practice activities of health workers as well as to understand the probability of the utilization of the ADDS as a first-line evaluation tool in general clinical practice. [Subjects and Methods] Two hundred subjects of various ages including both male and female patients with a history of vertigo and/or dizziness were included in the study and evaluated once using the ADDS. [Results] There were more female (59.5%) than male (49.5) patients in this study. Additionally, we found that most patients (64.4%) had a central mediated problem. In addition, the Amer Dizziness Diagnostic Scale has been found to have both a sensitivity and specificity of 96% that can adequately determine the possible diagnosis of vestibular disorders. [Conclusion] This study has demonstrated the validity of the ADDS scale, the predominance of female involvement related to supplementary medication, vitamin D deficiency, general lifestyle factors, and fluid retention, high sensitivity and specificity, provide differential diagnosis of vestibular disorders that could be used as a first-line evaluation tool in general clinics.

Key words: Dizziness, Vertigo, Balance

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INTRODUCTION

Dizziness is one of the most common symptoms that prompt clinical consultation. Although the sensation of imbalance is a common symptom¹⁻⁴⁾, it may indicate a serious condition. There are four types of dizziness. Described as the sensation of ground instability, vertigo is often accompanied by nausea, vomiting, and the inability to maintain balance, which can cause limit the ability to stand or walk⁵⁻⁷⁾. Lightheadedness refers to the feeling of faintness and weightlessness⁸⁾. Disequilibrium is the impaired sense of equilibrioception such that confident ambulation is impaired while presyncope is described as the sudden loss of consciousness associated with cardiovascular disorders as orthostatic hypotension⁹⁻¹¹⁾.

In general, the most common cause of vertigo is benign paroxysmal positional vertigo (BPPV)^{12, 13)}. Lightheadedness occurs with hyperventilation. Disequilibrium may be due to Multiple Sensory Deficit Syndrome while orthostatic hypotension can lead to presyncope. The 4th national morbidity survey estimates the worldwide rate and prevalence

of dizziness as 93 per 10,000 people per years at risk. More specifically, in the United States (US), the annual incidence in primary care was 1.7%, while outpatient recorded a higher percentage of 17% with a whole person lifetime risk of 25%. In contrast, the United Kingdom (UK) demonstrated a 40% incidence rate¹⁴⁾. In rural areas, the ratio was 1:4 for those between 50–65 years of age, while London recorded a 20% risk with younger age (25–64 years old)¹⁵⁾. Currently, with the evolution of advances in technology, a wide range of laboratory tests is available for the evaluation of the vestibular and balance systems along with the clinical history. These include video nystagmography (VNG) recording for eye examinations, caloric and rotary chair testing as well as electronystagmography (ENG)¹⁶⁻¹⁸⁾. Traditionally, electronystagmography has been considered as the “gold standard” for evaluating dizziness.

A simple scale called the Amer Dizziness Diagnostic Scale (ADDS) can be used for screening and diagnosis at the first clinical visit in order to guide patients toward the appropriate investigative procedures and management. It is especially useful for initial evaluation in general primary care clinics and for referral of patients who complain of dizziness to the appropriate medical specialist for further diagnosis and management. The scale has been found to have both a sensitivity and specificity of 96% for the diagnosis of patients with vestibular disorders. During the last several years, Saudi Arabia has undergone a massive improvement in the standard of living resulting in major changes in physical activity and eating habits. Low levels of physical fitness

*Corresponding author. Samira Al Senany (E-mail: salsenany@kau.edu.sa)

and an increasingly sedentary lifestyle are becoming more common in Saudi society¹⁹⁾ increasing the risk for lifestyle-related diseases including cardiovascular (i.e., coronary artery disease) and respiratory diseases, diabetes, anxiety, depression, and obesity^{20, 21)}.

Vitamin D plays an important role in maintaining bone structure and low levels result in osteoporosis, osteomalacia, and other bone diseases. Slight decreases in vitamin D levels can result in increased bone resorption and secondary hyperparathyroidism²²⁾. Regarding the significant role of sunlight in vitamin D production, it is hypothesized that vitamin D deficiency is more widespread in countries that do not have tropical climates. However, studies in the past two decades have demonstrated an increased prevalence of vitamin D deficiency in tropical countries, including Saudi Arabia by 30% and 93%²³⁾. Additionally, the increased use of the electronic systems (i.e., computers, television) and communication technologies will decrease physical activity in the coming years resulting in considerable health effects. This may cause an epidemic of non-communicable diseases along with their complications in the region²⁴⁾.

This study was performed in order to examine the validity, demographic features of the newly developed Amer Dizziness Diagnostic Scale (ADDS), provide differential diagnoses of vestibular disorders and assist in clinical research activities and practice of health workers. This study was also performed in order to understand the possibility of the increased utilization of ADDS as a first-line evaluation tool in general medical clinics so each member of the health care team can effectively screen patients who complain of dizziness and refer them to the appropriate specialist for diagnosis, consultation, and management. Since dizziness is multi-factorial disease and a global problem that is related to the level of physical activity and poor general lifestyle¹⁻⁴⁾.

SUBJECTS AND METHODS

Two hundred subjects from the Kingdom of Saudi Arabia who were of various ages, and included both male and female patients with a history of dizziness and/or vertigo, were enrolled in this study. The Institutional Review Board of the King Abdulaziz University approved this study. Otolaryngologists, neurologists, or family physicians in and around Jeddah referred all subjects for participation. After explaining the need for the study to potential subjects, informed consent and participation was obtained for this study. In order to evaluate the patients, we administered the Amer Dizziness Diagnostic Scale (ADDS) as a structured interview where participants were asked seventeen specific questions that cover different aspects of dizziness or vertigo, such as the type of dizziness, symptoms, tempo, circumstances, history etc. The questions in the scale were arranged as a hierarchical decision tree and each question was aimed at one behavior and required a “yes” or “no” answer. The presence and severity of the dizziness symptoms were rated on a scale based on the category or section. Thus, possible scores varied from 0 to 113, with each category of scores indicating a different diagnosis. The 17 questions in the ADDS were arranged into five categories. The first category included general information about the patients gender, age

as well as a history of hypertension, diabetes mellitus, balance problems, partial hearing loss associated with dizziness, and symptoms of blurred or double vision that results in vomiting. The second category was specific to the Unilateral Vestibular Hypo-function (UVH), and included a diagnosis of a viral or bacterial infection in the last two weeks, a history of blurred vision with or without vomiting and information on whether they drifted to one side when walking. The third category has a critical value for Benign Paroxysmal Positional Vertigo (BPPV), and includes questions about the sensation of dizziness while moving the head and with different body movements. The fourth category is related to the Central Mediated Problem (CM), and included information on the previous diagnosis of any neurological disorders, a history of concussions before experiencing dizziness, the sensation of lightheadedness or fainting while moving from the sitting to standing position and the presence of tinnitus. The fifth category, which relates to all previous vestibular disorders and to Cervicogenic Dizziness (CGD), focuses on the episodes of dizziness. Questions 1 to 16 were designed to be answerable with a “yes” or “no”, and question 17 was designated only for dizziness episodes. For each of the 17 questions, a “no” answer was always equivalent to 0. The first category did not have any score, while one point was given for every “yes” answer in the second category. For every “yes” answer, 5 and 20 points were given in the 3rd and 4th category, respectively. For the final category, if the dizziness lasted only seconds 1 point was given. If it lasted for minutes or hours, 5 and 20 points were given, respectively. If the total ADDS score was 0, a CGD was the most likely diagnosis. If the total score was between 1 and 4, the patient was diagnosed with UVH. Scores that were between 5 and 19 indicated Benign Paroxysmal Positional Vertigo (BPPV), while scores of 20 or higher, indicated the CM pathology. The scale was designed to establish the exact pathology so the patient can be directed to the specific diagnosis and the required treatment. The scale is of benefit for both clinicians and patients, because it is efficient and prevents unwanted and expensive diagnostic procedures. Participants were first evaluated using the ADDS before routine tests, audiometry, and neurological exams, as well as tests of VOR function for establishing any vestibular deficit, are performed. In order to measure the sensitivity and specificity, as well as the “true-positive” or “true-negative” responses; the results of both tests were then compared statistically to establish the correlation, sensitivity, and specificity of the scale.

RESULTS

The results were analyzed using the SPSS statistical package for Windows version 19.0 (SPSS, Inc., Chicago, IL, USA). The results of the statistical analysis as well as the characteristics of the 205 subjects who participated in this study are presented in Table 1. By using the Amer Dizziness Diagnostic Scale (ADDS), which utilizes clear and simple questions that are easy to understand, patients were directed toward the expected diagnosis. The comprehensive questions utilized appropriate language and length without any biases in the responses since these have been previously examined and approved by the experts.

Table 1. Baseline clinical characteristics of patients with vestibular disorders

Age (y), n (%)	Below 55 years	190 (92.7%)
	Above 55 years	15 (7.3%)
Gender, n (%)	Male	83 (40.5%)
	Female	122 (59.5%)
Diagnosis (Gold Standard)	BPPV	34 (16.6%)
	UVH	11 (4.5%)
	CGD	28 (13.7%)
	CM	132 (64.4%)

The results demonstrated the strong correlation between the ADDS and the “true-positive” and “true-negative” results ($r = 0.95$, $p < 0.05$). A stepwise linear regression was performed and the results indicated that ADDS was a significant predictor of “true-positive” and “true-negative” results ($R^2 = 0.90$, $p < 0.05$). Approximately 90% of the variability in “true-positive” and “true-negative” results were explained by their relationship to the ADDS. Based on the ADDS, there were 34 (16.6%), 11 (5.4%), 28 (13.7%), and 132 (64.4%) patients with BPPV, UVH, CGD, and CM, respectively, in this study. There were also more female (59.5%) than male (40.5%) patients in this study. Additionally, CM was diagnosed most frequently (64.4%) compared to the other types of dizziness. The ADDS was found to have both a sensitivity and specificity of 96% and can adequately capture a possible diagnosis of vestibular disorders.

DISCUSSION

The current study aimed to determine the validity of the newly developed Amer Dizziness Diagnostic Scale (ADDS), provide the differential diagnosis of vestibular disorders, assist in clinical research and practice, determine the possibility of utilizing the ADDS as a first-line evaluation tool in general clinical practice so each health care member can effectively screen patients with dizziness and refer them to the appropriate medical specialist for diagnosis, consultation, and management.

A multi-factorial disease, dizziness is one of the most common symptoms that prompt clinical consultation. Although the sensation of imbalance is a common symptom¹⁻⁴, it may indicate a serious condition. Typically, dizziness is divided into four subtypes—vertigo, lightheadedness, disequilibrium, and oscillopsia. This classification is still the basic definition of dizziness^{2, 3}. The ADDS consists of questions that provide the possible diagnosis and reasons for dizziness at baseline. Additionally, this scale may be useful in clinical research studies and practice as a first-line evaluation tool for dizziness. There are many scales that are used for patients who have already been diagnosed with ADDS, including the Dizziness Handicap Inventory (DHI) and the VSS-VER in order to establish the severity of dizziness and its clinical impact. The ADDS was utilized in this study as the basis for the differential diagnosis, examination, and treatment of dizziness as it functions as a relevant tool as well as a reliable reference guide for all healthcare workers.

Many clinicians have difficulty reaching the most accurate diagnosis even if they take a comprehensive history, since there is no valid diagnostic scale for dizziness. This study indicates that because the specificity and sensitivity of the ADDS for distinguishing between different vestibular disorders is high, it helps the inexperienced or general medicine physician to detect any patient with dizziness and facilitate the referral process. The next goal is to upgrade this scale by using different languages in order for this application to be used more globally and to assess more demands, social activities, establishing the reliability and discriminate validity of the ADDS. The primary benefit of this scale lies in its ability to provide a direct comparison between population and studies among different countries. The current study reveals that ADDS is the best tool for this role, since it has a close relationship with the measure of Vestibular Disorders. The ADDS consists of 17 questions that is arranged according five categories. The first category is general information about the patients that are intended for statistical and research purposes. The second category is specific to UVH especially with the characteristic symptom of drifting towards the same side while walking, a classical finding in UVH. The third category has a critical value for BPPV, where all questions are related to dizziness while moving the head and with different body movements^{3, 4}. The fourth category is related to the CM, which seeks to understand the role of the various clinical specialties in the further evaluation of symptoms, such that if diagnosed with Central Mediated the patient must be referred to the neurology clinic for consultation. The fifth category related to the CGD, is a diagnosis of exclusion. And at the end of the evaluation, the clinician must be able to diagnose the exact pathology and direct patients toward the required treatment. The results demonstrated higher proportion of female (59.5%) compared to male (40.5%) participants, which is usually related to the administration of the supplementary medication, vitamin D deficiency, general lifestyle and fluid retention. The differential diagnoses of central vestibular problems include stroke or tumor in the brain, migraine, Meniere’s disease, Pre-lymphatic fistula, and head trauma, based on the previous study entitled “Peripheral versus Central Vestibular Disorders.” According to studies, most cases (64.4%) involved the central vestibular system. This is because patients initially arrive with symptoms of central vestibular problems, which later converted to one of the other type of dizziness (i.e., UVH) due to accumulation of fluid in the inner ear²⁴⁻²⁶.

This scale shortens the long and expensive process for the patient and clinicians. In order to evaluate the sensitivity and specificity of the scale, we compared it to the standard routine testing of clinical signs and symptoms, audiometry, and neurological examination, along with tests of VOR function, which often serve as the “gold standard” for determining the probability of a vestibular deficit.

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