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Research Article

A study of Pulse Pressure as a Measure of Erectile Dysfunction Among Men in Ndola, Zambia

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Abstract

Introduction: Erectile Dysfunction is an increasing problem in developing countries. Studies have shown a prevalence of up to 45% among men of 45 years and older [1]. Erectile Dysfunction (ED) is related to the integrity of the arterial endothelium [2]. The Pulse Pressure (PP) is a good measure of the calibre of the arterial blood vessels. It is a sensitive predictor of cardiovascular events in ageing populations. In view of this, the study proposes the use of Pulse Pressure in predicting Erectile Dysfunction in ageing men.

Objectives: The objective of this study was to determine the accuracy of Pulse Pressure (PP) in predicting Erectile Dysfunction (ED) using the International Index of Erectile Function Score (IIEF5) in men aged 45 years and older at Ndola Teaching Hospital in Zambia.

Methods: The study was a cross-sectional study which recruited healthy men who were 45 years and older in Ndola, Zambia. The study compared the Pulse Pressure (PP) of men to the status of their sexual function based on the International Index of Erectile Function Score (IIEF5). The IIEF5 was categories into two groups. These groups were group 1 with Erectile Dysfunction (ED) and group 2 without Erectile Dysfunction. Those with IIEF5 score of 21 or less were defined as having ED, while those with IIEF5 score of 22 to 25 were defined has having no ED. Pulse Pressure of equal to or greater than 50mmHg was defined as a wide pulse pressure. While that of less than 50mmHg was defined as a normal Pulse Pressure. SPSS version 20 was used for data entry and analysis. The sensitivity, specificity, and correlation coefficient were used to compare the results obtained. Sensitivity was defined as the ability of the wide PP to detect an IIEF5 score of 21 and below. Whereas Specificity was defined as the ability of the normal PP to detect an IIEF5 score of 22 and above.

Results: We recruited 382 men with an age range between 45 and 91 years. The mean age was 54.9 years (standard deviation ± 9.73 years). The IIEF5 score showed that 158 men (41.4%) had no ED, and 224 men (58.6%) had ED. While, the PP was normal in 205 men (53.7%) and wide in 177 men (46.3%). The sensitivity of the PP to detect ED was 58.9%, and the specificity was 72%. This study showed that in our setting, PP can be used to screen for ED in men of 45years old and above.

Introduction

The prevalence of Erectile Dysfunction (ED) in men in Zambia has been reported at 62% [3], this is believed to increase with age. The risk factors for ED include age, Hypertension, Diabetes and a high Body Mass Index (BMI). The prevalence of Hypertension in Zambia ranges between 25 to 40% [4], while the prevalence of Diabetes is at 3.5 to 6% [5]. In clients who are Diabetic, or Hypertensive the ED prevalence has been reported to be as high as 85% [6].

The tool which is used to assess Erectile Function is the International Index of Erectile function Score (IIEF), which was modified in 1999 by Rosen [7]. It assess 5 sexual function parameters and scores them from 1 to 5. The score is a well validated measure of sexual function. Pulse Pressure is the difference between the Systolic and Diastolic Blood Pressure. The Pulse Pressure is a sensitive measure of vascular function. With ageing lipid materials are deposited in the sub intimal lining of arteries and this results in narrowing and stiffness of the vessels. This leads to a widening of the Pulse Pressure, because of an increase in resistance and a loss of vessel compliance. The physiology of Erection is dependent on rapid arterial inflow which leads to compression of venous outflow. It has been shown that a wide pulse pressure increases the risk of

Cerebrovascular Accident (CVA), Myocardial Infarction (MI) and Peripheral Artery Disease (PAD) [2]. Little literature is available on the relationship between Pulse Pressure and Erectile dysfunction.

The study objective was to determine the accuracy of Pulse Pressure to predict Erectile Dysfunction in men of 45years and older.

Methods

The study was performed in a Men's Clinic set up in the outpatient department of the Ndola Teaching Hospital. The case definition was any male patient aged 45 years and older in general good health.

The participants were consented, and three blood pressure readings were taken using an electronic Sphygmomanometer. The average reading was taken as the Blood pressure and used to compute the Pulse Pressure. A Pulse Pressure greater than 50mmHg was defined as wide, and PP of 50mmHg and less was defined as normal.

The study tool the International Index of Erectile Function 5 (IIEF5), was administered to participants by researchers. Words that the participants found difficult to understand were explained in the local language. The IIEF 5, has five questions which are scored 1 to 5, the total maximum score is 25, and the minimum score is 5. A score higher than 21 signifies no Erectile Dysfunction, while a score of 21 and below indicates Erectile dysfunction is present. For the purpose of validation, the IIEF5 was initially pre-tested. The IIEF5 score was computed and the patients categorized as ED (5-21) or No ED (22-25).

The sample size was calculated at a confidence of 95%, with a prevalence of 60% among a population of men 45 years and older (31,524) in Ndola. The sample size was calculated as 360.

The study was approved by the local Ethics Review Board. Prior to study enrolment, all participants, provided their informed consent. A research questionnaire was administered to each participant to obtain all vital epidemiological data from them.

The data was coded and then entered into the Statistical Package for Social Sciences version 20 (SPSS v20) software with double entry verification. Sensitivity was defined as the ability of a wide PP (>50mmHg) to detect ED (5-21). Specificity was defined as the ability of a normal PP to show the participant as having No ED (22-25). A correlation coefficient was computed to numerically represent the extent and direction of the relationship between the PP and IIEF5 score in this data set. The Pearson coefficient was computed using SPSS version 20.

Result

We recruited 382 patients. The age range was between 45 and 91 years with a mean age of 54.9 (standard deviation [SD] ± 9.7 years). The prevalence of Erectile Dysfunction was 58.9% this is shown in the bar graph in Figure 1. In Figure 2, a Scatterplot graph is used to show the correlation of PP and ED. Figure 3 shows the two by two tables of the Sensitivity and Specificity of the PP.

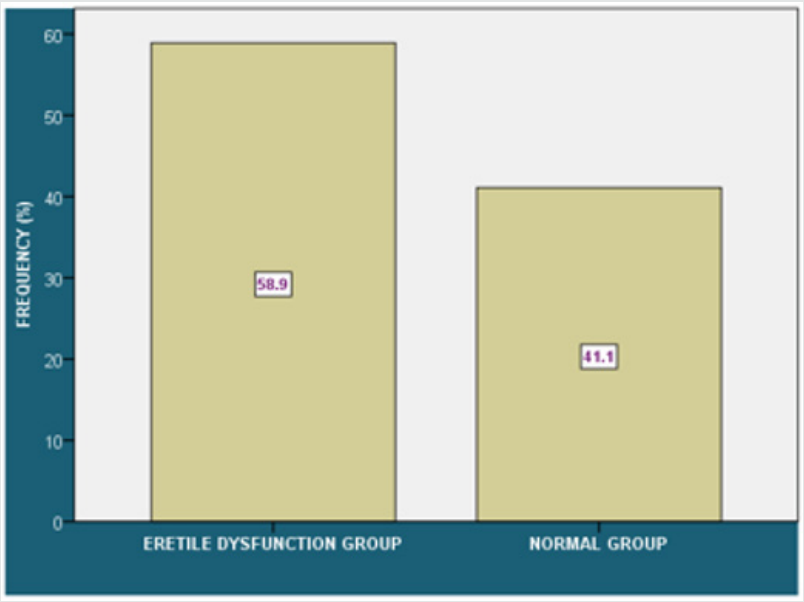

Figure 1: The prevalence Erectile dysfunction was 58.9% in the study participants.
Prevalence of Erectile Dysfunction

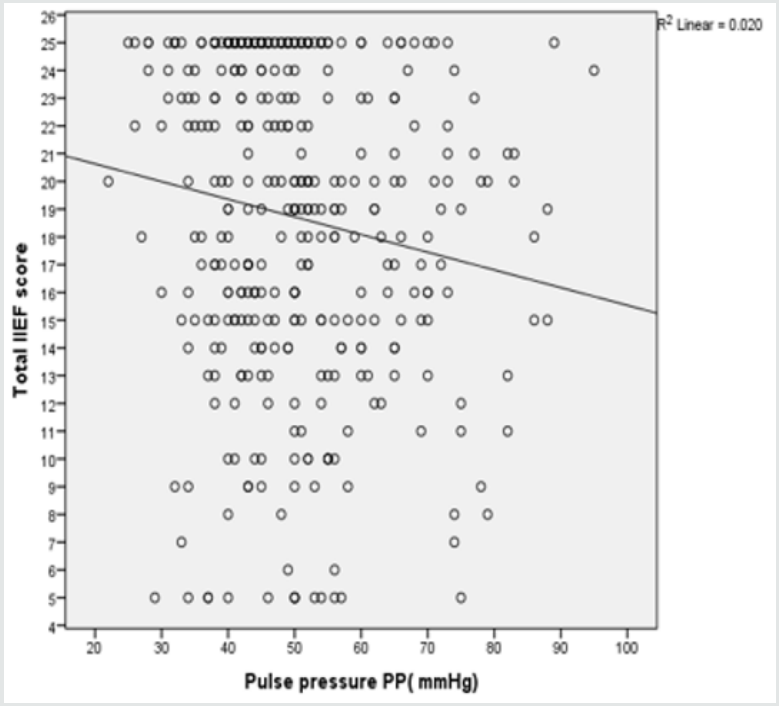

Figure 2: The Pearson correlation coefficient of PP to ED score is -0.142.
IIEF Score and Pulse Pressure

	ED Present	ED Absent	Total
Wide Pulse pressure	130[a]	44[b]	174
Normal pulse Pressure	95[c]	113[d]	208
Total	225	157	382

Figure 3: Shows the two by two table used to calculate the Sensitivity and Specificity of PP.
Sensitivity: 57.8% Positive Predictive value: 74.5%
Specificity: 72% Negative Predictive value: 54.3%

Discussion

The prevalence of Erectile Dysfunction in the study population is similar to that seen in other studies in Africa [8]. Studies have shown that with increasing age atherosclerotic disease increases and testosterone levels decline, hence the decline in Erectile function with age [9].

This study shows a linear relationship between Erectile Dysfunction and Pulse Pressure. With the increase in Pulse Pressure the Erectile Dysfunction score declines. The Pearson's Correlation coefficient is -0.142.

To the best of the authors' knowledge, this study was the first hospital-based study to compare Pulse Pressure to Erectile Function. The findings of the current study show that the PP may be used to screen men who may need further evaluation of Erectile Dysfunction. There was a moderate sensitivity of 57.8% and a high specificity of 72% in this study; hence, Pulse Pressure measurement can be used to direct ageing men to Andrology services. Other studies have shown that with increasing Pulse Pressure Vasculogenic Erectile dysfunction increases as well as a decline in free testosterone levels occurs. These effects are both mediated by ischaemic effects induced by the deposition of lipid materials in the Sub-intima lining of ageing blood vessels [10,11].

The detection of a wide Pulse Pressure presents advantages as an entry point to men's sexual health education. This will in turn help to reduce the cardiovascular risk of ageing men. Some studies have shown that a wide Pulse Pressure is an early sign of endothelial damage pausing a life-threatening risk of Cerebral Vascular Accident (CVA), Myocardial infarction (MI) and Chronic Renal Failure (CKD) [12-15].

In conclusion, the study shows that PP measurements may serve as an initial screening tool for Erectile Dysfunction in assessment of ageing men.

Limitations

The questionnaires for the IIEF5 was provider administered and was not translated into the local language. This may be a source of provider bias in the study data collected.

Ethical statement

This study has been approved by the ethical committee of the Ndola Teaching Hospital in Zambia. All participants signed an informed consent document. This paper has not been submitted to any other journal for publication.

Authors Contribution statement

Chitambala- This author was involved in the protocol designing, data collection, data analysis and manuscript write up.

Bowa- This author was involved in the project conceptualization, project development, data analysis and manuscript write up.

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