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Original Research Article

Pelvic organ prolapse quantification profile of women in Ile-Ife, Nigeria: determinants and symptom correlation

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ABSTRACT

Background: The true incidence of pelvic organ prolapse (POP) using validated method of examination in a wider range of population of women needs evaluation in our setting. This study determined the prevalence of the different POP quantification (POPQ) stages of POP and correlated these stages with clinical symptoms alongside the determinants of POP among women in Ile-Ife, Nigeria.
Methods: This was a cross-sectional study of consecutive, consenting four hundred women (aged 22-74years) attending the gynaecology, general outpatient, family planning, and well-woman clinics at Obafemi Awolowo university teaching hospitals complex, Ile-Ife, Nigeria between January 2016 and December 2016. Relevant biodata was documented in a purpose designed and pre-tested questionnaire, and the international consultation on incontinence questionnaire vaginal symptoms (ICIQ-VS) was administered. Data were analysed using IBM SPSS version 20.0. The prevalence of the different POPQ stages was determined. Logistic regression analysis was then performed to identify the significant determinants.
Results: The study showed a prevalence of POPQ of 13% (stage 0), 85.3% (stage I), 1.3% (stage II) and 0.5% (stage III). Age, parity, menopausal status, chronic constipation, childbirth position, caesarean section and lifting of heavy objects were the identified significant determinants.
Conclusions: There is a significant correlation between POPQ stage and the symptom 'feeling of lump in the vagina'. Chronic constipation and lifting of heavy objects are modifiable significant risk factors in our study population.

Keywords: ICIQ-VS, POP, POPQ

INTRODUCTION

Pelvic organ prolapse (POP) is the descent of the female pelvic organ(s) beyond its anatomical confine.[1] The POP prevalence rate is between 35% and 47%.[2-6] It has unfavorable effects on quality of life, via diminished body image and self-esteem as well as negative impact on sexual function. The lifetime risk of surgical intervention is between 10% and 20%.[7,8]

The prevalence of POP varies widely depending on the population and the study method. Studies determining prevalence rate based on POPQ examination findings have reported figures ranging from 35% in patients who required annual gynaecological examination to 47% for stage 2 among female subjects seen for routine gynaecological health care.[4,5] Prevalence rates of 30.8% and 31.8% have been reported in Sweden and France respectively. Some others studies determined prevalence using symptoms attributable to prolapse. Such studies have reported prevalence rates ranging from 2.9% to 6%.[6,7]

The POPQ system, developed in 1996 to standardize the staging of POP.[9-11] As at 1999, it was used only in 13% of studies.[11] It did take a long time for it to gain widespread acceptance. However, by 2007, the POPQ system was the first choice for staging in 82% of articles published on POP.[12] Today, it has become a basic protocol in any research activity involving POP and there is hardly any presentation at major scientific meetings that uses any grading system other than POPQ.

In Africa, only a handful of studies describing the prevalence of POP exist, and none of these studies had utilized the POPQ system. Majority of the African studies on POP were hospital-based audits describing the burden of POP as a proportion of gynaecological admissions, surgeries or clinic attendances. The community prevalence of POP in Nigerian and perhaps most other African countries is therefore uncertain. A hospital based study in Southeast Nigeria reported that 32.3% of their gynaecological admissions over a period of four years required pelvic reconstructive surgery, mostly for POP.[8] Interestingly, one particular African study carried out in Gambia determined the community prevalence of POP based on vaginal examination to be 46%.[9] The prolapse was however assessed using the Beecham classification and not POPQ. Comparison of these data with the global data which is currently based on the POPQ system thus becomes impossible. This study determined the prevalence of POP using the POPQ system and identified the determinants of POP among women in our setting.

METHODS

Study location

This study was conducted in the department of obstetrics and gynaecology of Obafemi Awolowo university teaching hospitals complex, Ile-Ife. There was a collaboration with the hospital's departments of family medicine and community health. The hospital has two arms offering tertiary healthcare: the Ife hospital unit in Ile-Ife and the Wesley guild hospital in Ilesha. Both are located in Osun state, South-west Nigeria.

Study design and duration

The study was a cross-sectional descriptive study that took place between January 2022 and December 2023.

Inclusion and exclusion criteria

All women 18 years or older attending the general outpatient, well woman, family planning, and gynaecology clinics in the two arms of the hospital were counseled about the study, and written consent was obtained from recruited participants. We excluded those who are pregnant or in the puerperium, those with gynetresia cervical cancer, women in the virginal state, and those who refused to participate in the study.

Sample size determination

The minimum sample size required for the determination of prevalence of POP in this study was calculated using the Fisher's formula.[12]

$N=Z^2pq/d^2$

Where N= sample size

Z is the standard normal variation, set at 1.96, corresponding to a 95 percent confidence interval.

P= prevalence of POP, which was 46% for stage 1 from a study done by Gutman et al.[13]

q= 1-p

d=Degree of precision (allowed margin for random error)

The allowed random error (d) margin was set at 5%, bringing this study's power to 90%.

$n=1.96^2 \times 0.46 \times 0.54/0.05^2=0.9542534/0.0025=351.701$

To account for 10% attrition rate, the sample was rounded up to 400 women.

Baseline data collection

Following recruitment, an interviewer-administered questionnaire was filled out for each subject, capturing relevant data related to the socio-demographic characteristics. The trained nurses then administered the validated ICIQ-VS to assess the symptoms and impact of POP.[14] The investigators who performed the POPQ examination were blinded to the ICIQ-VS scores of these patients.

POPQ examination

The instruments used in completing the POPQ examination included a standard bivalve speculum, Sims' speculum, a transparent plastic ruler, and an IUGA stix, which is a single-use calibrated wooden spatula purpose-designed for the POPQ examination. The assessment was performed with an empty bladder, and the patient was in the dorsal lithotomy position with 45 45-degree head-up

tilt. All measurements except the total vaginal length were taken while the patient was straining forcefully.

First, the genital hiatus (GH), the distance from the center of the external urethral meatus to the posterior midline hymen, is measured to the nearest 0.5cm using a clear plastic ruler. Next, the perineal body (PB), the distance between the posterior margin of the genital hiatus to the mid-anal opening is measured similarly using the plastic ruler.

After that, a bivalve speculum was inserted, and point C, a point that represents the most dependent edge of the cervix or the leading edge of the vaginal cuff in patients that have undergone total hysterectomy, was noted. The distance of point C from the hymen during forceful straining was measured using the IUGA stix to the nearest 0.5 cm. The posterior vaginal wall was then retracted with a Sims' speculum, and a point that was 3cm proximal to the external urethral meatus along the anterior vaginal wall was located- this was designated as point Aa. The Degree of descent of point Aa at maximal straining was determined by measuring the location of point Aa relative to the level of the hymen. Then the degree of descent of the most distal part of the rest of the anterior vaginal wall, i.e., point Ba, was also measured relative to the hymenal ring using the IUGA stix.

The Sims' speculum was repositioned to retract the anterior vaginal wall. The Degree of descent of the corresponding points Ap (a point that was 3cm proximal to the posterior hymenal ring along the posterior vaginal wall) and Bp (the most distal part of the rest of the posterior vaginal wall) was measured with the IUGA stix during maximal straining. After that, the distance of point D (the posterior fornix in a woman with a cervix) from the hymenal ring was measured with the IUGA stix during forceful straining. The Sims' speculum was subsequently removed, and any prolapse was digitally reduced to enable the measurement of the total vaginal length (tvl), which was the greatest depth of the vagina when point C or D was reduced to its full normal position.

After completing the measurement, the points were entered on the POPQ diagram to construct a vaginal profile, and all specific measurements were written in the POPQ grid.

Data collection and handling

Each patient's data (biodata proforma, ICIQ-VS, and POPQ measurements) were collated and given a patient's identification number. This was subsequently entered into an SPSS spreadsheet, and data cleaning was done. The data were kept confidentially in password-protected computer.

Statistical analysis

The data obtained from this study were analyzed using IBMSPSS 20. Means were generated for continuous variables and proportions for categorical variables. The categorical variables were compared using Chi-square where relevant. Receiver operating characteristics (ROC) curves were plotted to determine the relationship between POPQ stages and the symptom score. The Area under the curve (AUC) and p values were utilized to assess the significance of any association. The correlation was used to determine the relationship between the symptom score and the POPQ stage. The ideal cut-off symptom scores for the prediction of POPQ and its sensitivity and specificity for predicting symptoms were further determined from ROC analysis. In bivariate analysis, the relationship between socio-demographic variables, determinants, and the outcome measures (i.e., absent POP (stage 0) and presence of POP (stage I and above)) was done using chi-square. Variables associated with the outcome measure were subjected to binary logistic regression to establish determinants of POP. A statistically significant association was set at $p \leq 0.05$.

Ethical consideration

Ethical clearance was obtained for this study from the research and ethical committee of the Obafemi Awolowo university teaching hospitals complex, Ile-Ife. All participants were adequately counseled about the study and reserved the right to withdraw for whatever reason without any penalty.

RESULTS

Four hundred women participated in the study. Their ages ranged from 22 to 74 years, with a mean age of 39.98±10.5 years. About 41% of the respondents were 30-39 years old, and 75.8% had either secondary or tertiary education. More than half of the participants were traders (55.3%). The mean parity was 4.2±0.68, with the most significant percentage having parity ≥5 (23.8%). The body mass index ranged from 14.50 to 49.22 kg/m^2, with a mean value of 24.54±5.53 kg/m^2. The last birth interval median was 5 years with a range of 1 and 40 years. Three hundred and twenty-nine (82.3%) of the women were premenopausal, while the remaining 71 (17.7%) were postmenopausal. In addition to this, 18 women (4.5%) had urinary stress incontinence. The mean duration of incontinence was 27.11±23.75 months with a range of 6 to 96 months, as shown in Table 1.

Table 2 describes identifiable risk factors for POP among the study population. Less than half of the respondents (47.5%) gave a history of lifting heavy objects. Most of the respondents (88.0%) maintained dorsal position during their childbirth, while 282 (70.4%) had their labor and deliveries conducted by skilled attendants, as shown in Table 2.

From the study, the most prevalent stage of POP is stage 1. Only seven (1.8%) of the study population had significant prolapse, which was defined in this study as stage 2 or more, as shown in Table 3.

Table 4 shows the correlation between the POPQ stages and the vaginal symptoms. There is a correlation between the symptoms such as 'soreness in the vagina, reduced sensation in the vagina, lump in the vagina and insertion of finger to empty the bowel' and the POP Q stages. The correlation is, however, positive only with the symptom 'lump in the vagina.' There is also a significant association between the POPQ stages and the symptoms, with which correlations exist (Table 4).

Following logistic regression analysis, age, parity, menopausal status, chronic constipation, childbirth position, cesarean section, and lifting of heavy objects were found to be significant risk factors for POP (Table 5).

The receiver operating characteristic (ROC) analysis (Figure 1) revealed the low sensitivity of the symptoms in detecting the POPQ stage as all the curves are centrally located. The AUCs in Table 6 ranged between 0.492 and 0.551, indicating almost a complete overlap between a sick and healthy population.

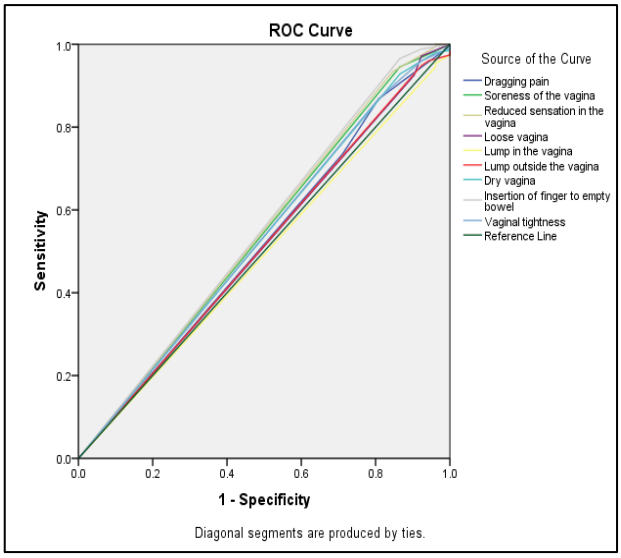

Figure 1: Receiver operating characteristics curve for POP symptoms.

Table 1: Socio-demographic characteristics of study participants, (n=400).

Characteristics	N	Percentage (%)
Age group (in years)		
Mean±SD	39.98±10.518	
18-29	59	14.7
30-39	165	41.3
40-49	95	23.8
50-59	55	13.7
60-69	17	4.2
≥70	9	2.3
BMI group (kg/m^2)		
<18.5	37	9.3
18.5-24.9	207	51.7
35.0-29.9	102	25.5
>30	54	13.5
Parity group		
Nulliparous	23	5.7
1	51	12.7
2	55	13.8
3	82	20.2
4	95	23.8
≥5	95	23.8
Mean±SD	4.2±0.68	
Educational status		
None	30	7.4
Primary	67	16.8
Secondary	123	30.8
Tertiary	180	45.0
Menopausal status		
Premenopausal	329	82.3
Postmenopausal	71	17.7
Marital status		
Never married	11	2.8
Currently married	368	92.0
Separated/divorced	11	2.7
Widowed	10	2.5

Table 2: Identifiable risk factors of POP among study participants, (n=400).

Risk factors	N	Percentage (%)
Difficult delivery		
Yes	75	18.7
No	280	70.0
Missing	45	11.3
Fundal pressure application		
Yes	65	16.3
No	290	72.4
Missing	45	11.3
Hysterectomy/prolapse surgery		
Yes	3	0.7
No	387	99.3
Straining at micturition		
Yes	8	2
No	392	98
Diabetes mellitus		
Yes	8	2
No	392	98
Chronic constipation		
Yes	48	12
No	352	88
Manual labour		
Yes	103	25.8
No	297	61.2
Uterine fibroid		
Yes	29	7.3
No	371	92.7
Pelvic surgery		
Yes	25	6.2
No	375	93.8
Pelvic inflammatory disease		
Yes	79	19.8
No	321	80.2
Lifting of heavy objects		
Yes	190	47.5
No	210	52.5
Episiotomy		
Yes	64	16.0
No	291	72.7
Missing	45	11.3
Childbirth position		
Dorsal	352	88.0
Standing	1	0.2
Squatting	2	0.5
Missing	45	11.3
Place of birth		
Skilled birth attendant	282	70.4
Traditional birth attendant	42	10.5
Home birth	31	7.8
Missing	45	11.3
Perineal tear		
Yes	103	25.7
No	252	63.0
Missing	45	11.3
Caesarean section		
Yes	64	16.0
No	291	72.7
Missing	45	11.3

Table 3: Prevalence of different POPQ stages of POP among women in Ile-Ife.

POPQ stage	N	Percentage (%)
0	52	13.0
I	341	85.2
II	5	1.3
III	2	0.5
IV	0	0.0

Table 4: Correlation between POP stage and symptoms.

Symptoms	Rho	P value
Dragging pain	-0.0168	0.7381
Soreness of the vagina	-0.1127	0.0241*
Reduced sensation in the vagina	-0.1173	0.0189*
Loose vagina	-0.0410	0.4137
Lump in the vagina	0.1550	0.0019*
Lump outside the vagina	0.0958	0.0556
Dry vagina	-0.0720	0.1509
Insertion of finger to empty bowel	-0.1585	0.0015*
Vaginal tightness	-0.0730	0.1451

RHO-Spearman's correlation coefficient, *****Statistically significant association.

Table 5: Logistic regression analysis of determinants of POP.

Determinants	β	Sig.
Age (in years)	0.185	0.002*
Parity	-0.732	0.004*
Weight	0.002	0.972
BMI	0.137	0.408
Menopausal status	-5.008	0.000*
Largest baby's weight	-0.383	0.349
Difficult delivery	-0.671	0.316
Fundal pressure	-0.751	0.284
Chronic cough	-0.298	0.833
Diabetes mellitus	-0.625	0.709
Straining at micturition	3.212	0.111
Chronic constipation	-2.106	0.007*
Childbirth position	-1.394	0.007*
Manual labour	-1.016	0.118
Episiotomy repair	-0.157	0.784
Caesarean section	4.027	0.033*
Uterine fibroid	18.787	0.998
Lifting heavy object	-1.730	0.008*
Place of birth	-.0007	0.988
Perineal tear repair	-0.455	0.451
Pelvic surgery	-0.757	0.604
PID	0.330	0.658
Constant	-0.408	0.862

*Statistically significant association.

Table 6: ROC curve for POP symptoms.

Variables	Area	Std. error	95% CI	Variables
Dragging pain	0.518	0.044	0.432	0.604
Soreness of the vagina	0.540	0.045	0.452	0.628
Reduced sensation in the vagina	0.545	0.045	0.456	0.633
Loose vagina	0.512	0.044	0.426	0.598
Lump in the vagina	0.492	0.042	0.408	0.575

Continued.

Variables	Area	Std. error	95% CI	Variables
Lump outside the vagina	0.512	0.044	0.427	0.597
Dry vagina	0.531	0.044	0.444	0.618
Insertion of finger to empty bowel	0.551	0.045	0.462	0.640
Vaginal tightness	0.531	0.044	0.444	0.618

DISCUSSION

This study evaluated the prevalence of pelvic organ prolapse and its significant determinants among women in Ile-Ife, South-West, Nigeria over a year using the standardized POPQ method as recommended by the international continence society in 1996, as well as the correlation between POP quantification stages and the different vaginal symptoms experienced by the women.

The mean age of the study population was 39.98±10.5 years, about the age at which most women would have achieved a significant part of their reproductive aspiration. The majority (41.3%) were within the age group of 30-39 years. This is similar to the mean age of 42.7±13.9 years by Swift et al.[14] On the other hand, Yang et al studied a population with a mean age of 67.8±10.7 years.[15] This variance could be because his study was carried out among women with ≥ stage 2, which is expected in the advanced age group.

The mean parity of this study population was 4.2±0.68. This is similar to the findings of previous surveys from other African countries.[16,17] The prevalence of POP using the POPQ system is as follows: Stage 0: 52 (13%), stage I: 341 (85.2), stage II: 5 (1.3%) and Stage III: 2 (0.5%). None of the women had stage IV prolapse. This is similar to the finding of Swift et al in which stage I was the most prevalent, and there was no stage IV. The reason for this could be that patients with stage IV prolapse would have sought medical care due to the distressing symptoms they might be experiencing.

The correlation between the POPQ stages and the different vaginal symptoms varied from analysis. There is a positive association between the POPQ stage and the following symptoms: soreness in the vagina, reduced sensation in or around the vagina, lump in the vagina, and insertion of a finger into the vagina to empty the bowel. Out of all these symptoms, the presence of a lump in the vagina is the only symptom with a positive correlation with the POPQ stage. Other symptoms have a negative correlation even though the p values are significant. This is similar to the finding of Talab et al and Swift et al who found a significant association between the POPQ stage and vaginal bulge.[19,14]

According to some studies, age is a significant determinant of POP.[20,21] This is similar to the finding in this study. Other determinants that were found in this study include parity, menopausal status, lifting of heavy objects, chronic constipation, childbirth position, chronic constipation, and cesarean section. Parity has been described as the most important risk factor for pelvic organ prolapse.[22] Other studies have also corroborated this fact.[14,23,24] This is similar to the findings of this study. The labor events are identical and constant across different geographical locations, which could explain the similarity in the findings. However, current systematic reviews established that vaginal parity (especially the first vaginal birth) is a strong predictor of the occurrence of POP and that cesarean section is protective.[23,25] Menopausal state is also an identified risk factor for pelvic organ prolapse.[14,23,25] This is also the case in this study.

Different authors define Significant pelvic organ prolapse as POPQ stage 2 and above.[26-29] Only 1.8% of the study population had significant prolapse. This is lower than the 11.8% reported by a previous study in South Korea [30] This contrast may be due to the presence of protective genetic composition in our study population, as seen in some studies in which the mutation of the gene COL3A1 rs1800255 genotype AA and other connective tissue genes have been found responsible for significant POP.[27-29,31,32]

The ROC analysis is used to determine the sensitivity and specificity of a test (or symptom of a disease) in predicting the actual presence of the disease. The AUROC is used to measure how good the test (or symptom) is in predicting the actual presence of the disease. A perfect test has an AUROC of 1 (one) with no overlap between healthy and sick populations, while a fragile test (or symptom) has an AUROC of 0.5 with complete overlap. We generated AUROC with each symptom of POP in this study. This varied between 0.492 and 0.551 for all the symptoms with almost complete overlap, showing that the symptoms in this study are too weak at predicting the presence of significant POP (i.e., ≥ POPQ stage 2). This is similar to Teleman et al. 's report.[33] He concluded that the urogenital symptoms, based on the questionnaire scores, failed to predict the presence of significant POP.

The findings from this study should be interpreted in light of the following limitations: firstly**,** this study used information obtained via a questionnaire. This is known to be limited by recall bias. Also, the respondents may deliberately withhold some information. Lastly, being a cross-sectional study, the temporary link between outcome and exposure cannot be determined.

CONCLUSION

The prevalence of significant POP using the POPQ pelvic system is relatively low among the women attending clinics in our setting**.** There is a strong association between the POPQ stage and the presence of a lump in the vagina

as one of the symptoms of POP. Age, parity, menopausal status, chronic constipation, childbirth position, cesarean section, and lifting of heavy objects are significant determinants of POP in this study population. Chronic constipation and lifting of heavy objects are modifiable considerable risk factors of POP in this study. Therefore, efforts should be made by women to avoid these risk factors. Multi-center research is recommended to popularize the use of POPQ examination further in assessing POP, and it can be extended into our daily clinic activities.

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