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Determinants of pelvic organ prolapse among gynecologic patients, Northeastern Ethiopia, 2020: A case–control study

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Abstract

Background: The majority of women in developing countries, including Ethiopia, do not seek medical help; as a result, they face substantial impacts on their health. There is a lack of attention to screening women at high risk for pelvic organ prolapse. Identifying the determinants of pelvic organ prolapse is essential for the early screening and prevention of adverse health outcomes in women.

Objectives: To identify the determinants of pelvic organ prolapse among gynecologic patients at Akesta Hospital, 2020.

Design: An unmatched case–control study was conducted among 70 cases and 140 controls.

Methods: The study participants were selected using a systematic sampling technique. Data were collected by reviewing patient charts. The data were entered into EpiData version 4.6 and analyzed using SPSS version 25. Text, tables, and figures were used for data presentation. P values less than 0.2 in binary logistic regression were entered in multivariable logistic regression. Finally, P values less than 0.05 were considered significant factors for the determinants of pelvic organ prolapse.

Results: A total of 189 respondents participated in the study. Of the total respondents, 63 were cases and 126 were controls. Patients whose parity was four or above developed pelvic organ prolapse three times more likely than those whose parity number was less than four (adjusted odds ratio = 3.05; 95% confidence interval: 1.35–6.90; P = 0.007). Patients who are overweight are 8.5 times more likely to develop pelvic organ prolapse than patients with normal weight (adjusted odds ratio = 8.5, 95% confidence interval: 2.75–26.51; P = 0.001). Patients with a history of intestinal obstruction were five times more likely to develop pelvic organ prolapse than their counterparts (adjusted odds ratio = 4.87, 95% confidence interval: 1.61–14.75, P = 0.005).

Conclusion: Educational level, being overweight, having four parities and above, minimum duration of labor, history of urinary retention, and intestinal obstruction were determinants of pelvic organ prolapse. Screening should target women with illiteracy, overweight, and whose parity is four and above. Early diagnosis and treatment of urinary retention and intestinal obstruction should be provided to women with pelvic organ prolapse.

Keywords

determinants, Northeastern Ethiopia, pelvic organ prolapse

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Introduction

Pelvic organ prolapse (POP) is the downward displacement of pelvic organs such as the uterus, bladder, small bowel, and large bowel through the vaginal wall or anal canal.[1] It has different classifications. According to the pelvic organ prolapse–Q (POP-Q) system, POP has different stages: stage 0 is no prolapse, stage 1 is the prolapse 1 cm above the hymen, stage 2 is the prolapse 1 cm or less away from the hymen, stage 3 is the prolapse over 1 cm below the hymen

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but at least 2 cm shorter than the total length of the vagina, and stage 4 is the entirety of the vagina everted itself.[2]

POP may be caused by pelvic floor birth injury, genetic predisposition, connective tissue dysfunction, conditions causing chronic increases in intra-abdominal pressure, and others.[3]

It is associated with vaginal bulge or protrusion symptoms, obstructive urinary and defecatory symptoms with sexual dysfunction,[3] and urinary incontinence.

The magnitude of POP differs from region to region. The American College of Obstetricians and Gynecologists revealed that women in the United States have an 11% risk of POP in their lifetime. By 2050, the prevalence of POP will reach 50%.[4] The national prevalence of POP in Ethiopia is unknown; however, a community-based study conducted in the eastern part of the country showed that the prevalence of POP is 9.5%.[5]

Studies have shown that POP is associated with various factors. A recent systematic review indicated that parity, vaginal delivery, age, and body mass index are associated with risk.[6] Among these factors, parity,[3,7] due to injury of the levator ani muscle, and age[7,8] were the most frequent factors. Family history of pelvic organ prolapsed,[8,9] illiteracy,[8,9] chronic cough,[8] strain,[9] constipation,[8] being a farmer,[7,8] prolonged duration of labor,[7] and place of delivery[7,8] were the other factors associated with POP.

Various studies have shown that POP has numerous negative impacts on women's multidimensional functions. One recent study showed that POP impairs women's quality of life, which affects their mood, sleep, relationship, and social function.[3] Another population-based study conducted in Pakistan showed that 60.8% of women reported that their day-to-day lives, such as hygiene, home/work life, social life, and quality of life, were moderately and severely impaired.[10]

In another study, the majority of patients were prevented from working.[10,11] A recent prospective cohort study revealed that approximately one-fifth of participants reported sexual dysfunction.[12] Not only these but also POP causes women to undergo surgery.[7]

There is a lack of attention to screening women at high risk for POP. As the literature shows, a majority of women in developing countries, including Ethiopia, do not seek medical help[11]; as a result, they face substantial impacts on their health. Identifying the determinants of POP is essential for the early screening and prevention of such negative impacts. There are no adequate studies that exclusively show the determinants of POP in Ethiopia. Thus, this study aimed to assess the determinants of POP among gynecologic patients at Northeastern Ethiopia.

Methods and materials

Study area and period

The study was conducted at Northeastern Ethiopia between April and May 2020.

Study design

An unmatched case–control study was employed.

Source population

Cases. All gynecologic patients with any POP at Northeastern Ethiopia.

Controls. All gynecologic patients with no history of POP at Northeastern Ethiopia.

Study population

Cases. All gynecologic patients with any type of POP at Northeastern Ethiopia during the study period.

Controls. All gynecologic patients with no history of POP at Northeastern Ethiopia during the study period.

Inclusion criteria

Cases. All gynecological patients with any type of POP treated at the gynecology ward and aged ⩾18 years were included.

Controls. All gynecological patients with no current or history of POP were included.

Exclusion criteria

Cases. All gynecological patients with POP with no full information in their document or charts were excluded from the study.

Controls. All gynecological patients with no current or past history of POP and incomplete documentation were excluded from the study.

Sample size determination

The sample size was calculated using Epi Info version 7 by considering 95% confidence intervals (CIs), 80% power, and odds ratios of determinant factors. Sphincter damage, one of the factors that yielded the maximum sample size, was taken from a previous study conducted in Bahir Dar town.[9] From the output of the StatCalc table, a total sample size was 210. The total sample size was divided into case and control groups at 1:2 ratio. Thus, the number of cases was 70 and that of the controls was 140.

Sampling technique

In this study, a systematic random sampling technique was employed. Initially, the total number of admitted cases and controls was counted. Consequently, all cases were taken.

The sample populations for the control were selected at every kth value, which were 6. From the six patients, the first patient was selected using a simple random sampling technique. The K value was calculated as follows

$$K \rightarrow \text{Total number controls in the past threeyears} / \text{controls}$$
$$\rightarrow 691/126 = 5.48 \sim 6$$

Variables

The dependent variable was POP, and the independent variables were sociodemographic variables (age, educational status, residence, religion, ethnicity, occupation, and marital status), body mass index, parity, duration of labor, number of births/parity, place of delivery, history of instrumental delivery, history of surgery, history of chronic cough, history of constipation and straining, history of abortion, family history of POP, history of urinary incontinence, and intestinal obstruction.

Data collection tool and procedure

The data collection tool was adapted from different studies.[9,11] It had two parts. The first part consisted of sociodemographic questions, and the second part consisted of factors that affected POP. The content validity of the tool was verified by senior gynecological experts. After preparing the tool, the tool was pretested on 10% (7 cases and 14 controls) at Mekane Selam Hospital. Medical record numbers for both case and control respondents were obtained from the health information system, and the patients' charts were reviewed. The data were collected through a review of patients' charts by four BSc nurses. Body mass index was calculated by dividing the weight in kilograms by the square of height (m).

Statistical analysis

Data were checked for completeness and inconsistencies. EpiData version 3.1 was used to enter, clean, and code the data. Then, IBM SPSS version 25 was used to analyze the data. The model fitness was checked by the Omnibus and Hosmer and Lemeshow test for goodness of fit in the logistic regression model. The multicollinearity test was checked with tolerance, variance inflation factor, and condition index values. The crude odds ratio was used to estimate the association in the bivariable logistic regression analysis. Variables with a P value < 0.2 in the bivariate logistic regression analysis were included in the multivariate logistic regression analysis. An adjusted odds ratio (AOR) with a 95% confidence level was used to assess the strength of the association. A P value < 0.05 was used to indicate statistical significance. The final finding was presented using tables, frequencies, charts, and texts.

Result

Sociodemographic characteristics

In this study, a total of 189 participants were involved, for a response rate of 90%. Of the total respondents, 63 were cases and 126 were controls. The median age of the respondents was 37 (interquartile range (IQR)=21). Among the total respondents, 137 (72.5%) lived in rural areas, 150 (79.4%) were married and 26 (13.8%) were overweight. Regarding the reproductive age of the cases, 37 (58.7%) were less than 49 years. In addition, 17 cases (27%) were overweight (Table 1).

Obstetrics and other related factors

Among the total respondents, 21 (18.3%) did not give birth. From 168 respondents who gave birth, only 75 (70.1%) of controls and 31 (50.8%) of cases delivered at a health institution. Of the patients who delivered in a health institution, 5 (16.1%) had a history of instrumental delivery. Among the total cases, 4 (6.3%) of them had a history of abortion, and 16 (26.2%) of them had a history of prolonged labor in at least one of their labors (Table 2).

Factors associated with POP

Variables that were associated with POP at P value $\leqslant 0.2$ in bivariable logistic regression were age, residence, educational level, body mass index, parity, place of delivery, duration of labor, history of urinary retention, and history of intestinal obstruction. All these variables were entered into multivariable logistic regression to identify factors associated with POP by controlling for confounding variables. However, in multivariable logistic regression, educational level, body mass index, parity, duration of labor, history of urinary retention, and intestinal obstruction were associated with POP at a P value of <0.05. Patients whose number of parities was four and above developed POP three times more likely than patients whose number of parities was less than four (AOR: 3.05; 95% CI: 1.35–6.90; P=0.007). Patients who were overweight developed POP 8.5 times more likely than patients with normal weight (AOR: 8.5, 95% CI: 2.75–26.51; P=0.001). Patients who had a history of intestinal obstruction developed POP five times more likely than their counterparts (AOR: 4.87, 95% CI: 1.61–14.75, P=0.005). Moreover, being illiterate (AOR: 7.08, 95% CI: 1.23–40.87; P=0.028), more than a 24-hour duration of labor (AOR: 0.31, 95% CI: 0.12–0.76; P=0.010) and a history of urinary retention (AOR: 3.01, 95% CI: 1.16–7.78, P=0.022) were other factors significantly associated with POP (Table 3).

Discussion

POP is one of the main gynecological problems in developing countries and results in socioeconomic problems

Table 1. Sociodemographic characteristics of respondents at Northeastern Ethiopia, 2020 (cases: 63, controls: 126).

Variable	Category	Control (N = 126) Frequency (%)	Case (N = 63) Frequency (%)
Age	⩽49	105 (83.3)	37 (58.7)
	50–64	19 (15.1)	18 (28.6)
	⩾65	2 (1.6)	8 (12.7)
Residence	Rural	85 (67.5)	52 (82.5)
	Urban	41 (32.5)	11 (17.5)
Educational status	Illiterate	28 (22.2)	21 (33.3)
	Able to read and write (informal school)	27 (21.4)	18 (28.6)
	Grades 1–8	34 (27.0)	22 (34.9)
	High school and above	37 (29.4)	2 (3.2)
Marital status	Single	12 (9.5)	3 (4.8)
	Married	98 (77.8)	52 (82.5)
	Divorced	13 (10.3)	5 (7.9)
	Widowed	3 (2.4)	3 (4.8)
Religion	Muslim	82 (65.1)	45 (71.4)
	Orthodox	40 (31.7)	18 (28.6)
	Protestant	4 (3.2)	0 (0)
Occupation	House wife	57 (45.2)	41 (65.1)
	Farmer	43 (34.1)	13 (20.6)
	Merchant	12 (9.5)	6 (9.5)
	Employee	9 (7.1)	2 (3.2)
	Others	5 (4.0)	1 (1.6)
Ethnicity	Amhara	115 (91.3)	62 (98.4)
	Oromo	11 (8.7)	1 (1.6)
Body Mass Index	$<18.5\,kg/m^2$	17 (13.5)	9 (14.3)
	$18.5–24.99\,kg/m^2$	100 (79.4)	37 (58.7)
	$\geqslant 25\,kg/m^2$	9 (7.1)	17 (27.0)

Body mass index was based on World Health Organization weight classification for Ethiopia.

and decreases women's productivity. Identifying factors associated with POP is helpful for the early screening and prevention of high-risk women. Thus, this study aimed to identify determinant factors for POP among female patients.

In this study, educational status was statistically associated with POP. Patients who were illiterate developed POP seven times more likely than patients whose educational status was high school and above. The possible justification for this might be low health perception and management among illiterate patients. Patients with a low health perception and management did not keep themselves at risk for POP. In contrast, literate patients controlled their fertility and sought medical help during health problems. This finding is in line with a study conducted in Bahir Dar town,[9] Nepal,[13] Wolaita Sodo University Referral Teaching Hospital.[8]

The risk for POP increased as weight increased. The findings of this study revealed that patients who were overweight developed POP 8.5 times more likely than patients with normal weight. The possible justification for this could be increased intra-abdominal pressure that causes weakening of pelvic floor muscles and fascia in obese patients. This is in line with the findings of a prospective cohort studies and systematic review and meta-analysis.[14] However, a study conducted in Bahir Dar town, northwest Ethiopia,[9] showed a contradictory result to the findings of this study.

While the number of parities was increased, the risk of developing POP was also increased. This study revealed that patients whose parity was four and above developed POP three times more likely than patients whose parity was less than four. The reason for this might be due to muscle and ligament damage in multipara women. When the parity increases, levator ani injuries occur after vaginal delivery. This finding is in line with the findings of a study conducted in Bahir Dar city, northwest Ethiopia[9]; Jimma, southwest Ethiopia[7]; Nepal[13]; and Nigeria.[15] However, this study is inconsistent with the findings of a study conducted in Wolaita Sodo University Referral Teaching Hospital.[8]

Different studies[13,16] have shown that POP occurs in patients whose labor is prolonged. However, the findings of this study revealed a contradictory finding. Patients whose labor was prolonged (24 h and above) were protected from POP compared with patients whose labor was

Table 2. Obstetrics and other related characteristics of controls and cases at Northeastern Ethiopia, 2020 (cases: 63, controls: 126).

Variables	Category	Control (N = 126) Frequency (%)	Case (N = 63) Frequency (%)
Gave birth	Yes	107 (84.9)	61 (96.8)
	No	19 (15.1)	2 (3.2)
Number of parity	<4	63 (58.9)	22 (36.1)
	>4	44 (41.1)	39 (63.9)
	Total	107 (100)	61 (100)
Maximum duration of labor	<24 h	64 (59.8)	45 (73.8)
	⩾24 h	43 (40.2)	16 (26.2)
	Total	107 (100)	61 (100)
Place of delivery	Home	32 (29.9)	30 (49.2)
	Health institution	75 (70.1)	31 (50.8)
	Total	107 (100)	61 (100)
History of any instrumental delivery	Yes	6 (8.0)	5 (16.1)
	No	69 (92.0)	26 (83.9)
	Total	75 (100)	31 (100)
History of pelvic surgery	Yes	1 (0.8)	4 (6.3)
	No	125 (99.2)	59 (93.7)
History cough	Yes	36 (28.6)	11 (17.5)
	No	90 (71.4)	52 (82.5)
Duration of cough	<2 weeks	30 (83.3)	7 (63.6)
	⩾2 weeks	6 (16.7)	4 (36.4)
	Total	36 (100)	11 (100)
History of constipation or straining	Yes	16 (12.7)	12 (19.0)
	No	110 (87.3)	51 (81.0)
Family history of POP	Yes	8 (6.3)	0
	No	118 (93.7)	63 (100)
History of Abortion	Yes	0	4 (6.3)
	No	126 (100)	59 (93.7)
History of urinary retention	Yes	33 (26.2)	27 (42.9)
	No	93 (73.8)	36 (57.1)
History of intestinal obstruction	Yes	9 (7.1)	17 (27.0)
	No	117 (92.9)	46 (73.0)

Home delivery is at least one of the births. The maximum duration of labor is for the previous birth(s). POP: pelvic organ prolapse.

less than 24 h. The reason for inconsistency between the findings might be the difference in cut point of the duration of labor and types of labor. This study took the maximum duration of labor for all stages of labor, unlike the others.

In this study, the association between a history of urinary retention and intestinal obstruction with POP was observed. Patients who have a past history of urinary retention developed POP three times more likely than their counterparts. Patients who had a past history of intestinal obstruction developed POP five times more likely than patients who did not have a past history of intestinal obstruction. The reason for this could be increased intra-abdominal and downward bearing pressure from the distended intestinal lumen or bladder. This finding is consistent with a recent report published in the United States.[17]

Advanced age,[7,8,11,15] living in rural areas,[7,8] chronic cough,[7,8] and family history of pelvic organ prolapsed[8,9] were determinant factors associated with POP. However, in this study, none of these determinant factors were statistically associated with POP. The reason for this discrepancy could be the difference in the study population, sample size, and difference in sociodemographic characteristics. For example, a study conducted in Bench Maji Zone included community-dwelling women.

Limitation

This study has its own limitations. The first limitation is recall bias because patients may forget their experiences or health-related events before developing POP. Using a small sample size and being an unmatched study design were also other limitations. In addition, the study was conducted at the hospital level, so we did not include patients with less severe symptoms.

Table 3. Factors associated with pelvic organ prolapse at Northeastern Ethiopia, 2020 (cases: 63, controls: 126).

Variable	Category	Controls (N = 126)	Cases (N = 63)	COR (95% CI)	AOR (95% CI)	P value
Age	<49	105	37	1		
	50–64	19	18	2.68 (1.27–5.66)		
	>65	2	8	11.35 (2.3–55.89)		
Residence	Rural	85	52	2.28 (1.07–4.82)		
	Urban	41	11	1		
Educational status	Illiterate	28	21	13.87 (3.0–64.15)	7.08 (1.23–40.87)	0.028
	Informal school	27	18	12.33 (2.63–57.7)	4.89 (0.81–29.57)	0.084
	Grades 1–8	34	22	11.97 (2.61–54.7)	16.41 (2.65–101.3)	0.003
	High school and above	37	2	1	1	
Body mass index	<18.5 kg/m^2	17	9	1.43 (0.58–3.49)	0.92 (0.27–3.19)	0.903
	18.5–24.99 kg/m^2	100	37	1	1	
	⩾25 kg/m^2	9	17	5.1 (2.09–12.54)	8.53 (2.75–26.51)	0.001
Gave birth	Yes	107	61	5.41 (1.22–24.04)		
	No	19	2	1		
Number of parity	<4	63	22	1	1	
	>4	44	39	2.53 (1.32–4.85)	3.05 (1.35–6.90)	
Maximum duration of labor	<24 h	64	45	1	1	
	⩾24 h	43	16	0.52 (0.26–1.05)	0.31 (0.12–0.76)	0.010
Place of delivery	Home	32	30	2.26 (1.18–4.37)		
	Health institution	75	31	1		
History of urinary retention	Yes	33	27	2.11 (1.11–3.99)	3.01 (1.16–7.75)	0.022
	No	93	36	1	1	
History of intestinal obstruction	Yes	9	17	4.80 (1.99–11.54)	4.87 (1.61–14.75)	0.007
	No	117	46	1	1	

Hosmer and Lemeshow test = 0.099; home delivery is at least one of the births.
COR: crude odds ratio; CI: confidence interval; AOR: adjusted odds ratio.

Conclusion

In this study, educational level, being overweight, having ⩾4 parties, and the minimum duration of labor were determinant factors associated with POP. In addition, this study revealed that a previous history of urinary retention and intestinal obstruction were associated with POP. Health extension workers and other health care providers should focus and provide health advice on the risk factors for POP in illiterate individuals. Patients who were overweight and whose parity was 4 and above should be screened for POP regularly. Early diagnosis and treatment of urinary retention and intestinal obstruction should be performed. It is imperative for researchers to conduct extensive research with matched case–control study designs with possible large sample sizes.

Declarations

Ethics approval and consent to participate

Ethical clearance and approval were obtained from the Wollo University, College of Medicine and Health Sciences institutional review board (approval number: Res/Com/Ser/&Postgra/Coor/Off: 112/11) and conformed to the provisions of the Declaration of Helsinki. A letter of cooperation was obtained from the Legambo Health Bureau. Written consent was obtained from individual respondents. The participants' confidentiality was secured throughout the study, and information regarding the identification of the patient was recorded anonymously. Information on the study was explained to the participants, including the objectives, procedures, and benefits of the study. The respondents were informed that they had the right to refuse or declined participation in the study at any time.

Consent for publication

Not applicable.

Author contribution(s)

Afework Edmealem: Conceptualization; Formal analysis; Investigation; Methodology; Writing – review & editing.
Sewunet Ademe: Conceptualization; Formal analysis; Investigation; Methodology; Writing – original draft.
Mulugeta W/Selassie: Conceptualization; Formal analysis; Investigation; Methodology; Writing – original draft; Writing – review & editing.

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