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Urinary incontinence and associated factors among pregnant women attending antenatal care in public health facilities of Mekelle city, Tigray, Ethiopia

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Abstract

Background: Urinary incontinence is any involuntary leakage of urine. It has serious negative health impacts on quality of life in pregnant women. According to the scientific committee of the International Continence Society report, worldwide prevalence of urinary incontinence estimated ranges between 32% and 64% among pregnant women. However, there is scarcity of evidence on prevalence and associated factors of urinary incontinence in Ethiopia.

Objective: The aims of this study were to assess prevalence and associated factors of urinary incontinence among pregnant women attending antenatal care in public health facilities of Mekelle city, Tigray, Ethiopia.

Methodology: Institution-based cross-sectional study design was conducted. Data were collected using an interviewer-administered structured questionnaire. Physical examination was done to assess the strength of pelvic floor muscles. The data were entered to EPI Info version 7 and analyzed using SPSS version 23. Bivariate and multivariate logistic regression analyses were done to investigate the factors associated with urinary incontinence.

Results: Among 317 respondents, the prevalence of urinary incontinence was 23%. The contributing factors that had statistically significant association with urinary incontinence were gestational age (adjusted odds ratio: 9.6 (1.87–49.39, 95%), parity (adjusted odds ratio: 6.32 (1.48–27.05), 95% confidence interval), prior miscarriage (adjusted odds ratio: 6.28 (2.15–18.28), 95% confidence interval), constipation (adjusted odds ratio: 8.25 (3.12–21.84), 95% confidence interval), respiratory problem (adjusted odds ratio: 6.31 (2.05–19.43), 95% confidence interval), and weak pelvic floor muscle (adjusted odds ratio: 7.55 (2.51–22.67), 95% confidence interval).

Conclusion: The prevalence of urinary incontinence is moderate compared to other studies. Gestational age, parity, prior miscarriage, having constipation, having respiratory problem, and weak pelvic floor muscle had significant association with urinary incontinence. This finding will help to increase the awareness of health care professionals involved in the care of pregnant women about urinary incontinence.

Keywords

antenatal care, pregnancy, prevalence, risk factors, urinary incontinence

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Introduction

Urinary incontinence (UI) is any involuntary leakage of urine, according to the International Continence Society.[1] It has serious negative impacts on quality of life (QOL) in pregnant women, by affecting physical, social, and psychological well-being which results in depression, decreased self-esteem, and social isolation which needs special care and management.[2] There are different forms of UI: stress urinary incontinence (SUI), urgency urinary incontinence (UUI), and mixed incontinence (MUI). SUI is the most common type of UI, followed by MUI and UUI during pregnancy.[3] The worldwide prevalence of UI is estimated to be about 200 million women among the female population; those of child-bearing age are usually affected, especially during the late trimester of pregnancy.[4,5] Its prevalence in pregnancy ranges between 32% and 64% worldwide according to the International Consultation on Incontinence report.[6] Even though pregnant women are vulnerable to UI, the exact etiology is not well stated, but conjecture regarding the cause of UI suggests that physiological and anatomical changes during pregnancy which may lead to reduced strength of supportive and sphincter function of pelvic floor muscles (PFMs), maternal age, multiparty, gestational age and mode of delivery, and weight gain have been suggested in different studies.[7–9] Pregnant women who did PFM training had substantial lower incidences of UI during pregnancy and postpartum.[10,11] Most of the women affected by UI are uncomfortable to discuss about their problem to health care professionals, as they are not aware that there are ways to manage the problem, feeling a sense of shame, and fear of discrimination which led women to hide their emotions and problems.[12] Therefore, this study was intended to assess the magnitude and identify the associated factors of UI among pregnant women attending antenatal care (ANC) in public health facilities in Mekelle city.

Methods

Study area, period, and study design

This study was conducted in public health facilities in Mekelle city, Tigray from April–15 May 2019. Mekelle is the capital city of Tigray regional state, which is located around 783 km away from the capital city of Ethiopia. The city has four hospitals and eight health centers which provide ANC for pregnant women. This study was conducted at randomly selected two public hospitals (Mekelle General Hospital and Ayder Comprehensive Specialized Hospital) and four health centers (Semien, Adeha, Adishumdhun, and Mekelle) based on proportional allocation. An institutional-based cross-sectional study was conducted among pregnant women attending ANC in Mekelle city public health facilities.

Inclusion and exclusion criteria

All women who were attending ANC at the randomly selected health facilities during the data collection period were included in the study. Out of this population, those women attending postnatal care who had diagnosed with urinary tract infection were excluded.

Sample size and sampling technique

Sample size was determined by the formula for single population proportions, using the assumption of a 5% level of significance, marginal error of 5%, and 10% non-response rate. Hence, using the assumption of 11.4% expected prevalence,[13] assumption of expected population size of 2484, the sample size was 146 subjects. After adding 10% for non-response rate and multiplying factor of 2 for design effects, the final sample size was 321 study participants. A simple random sampling technique (using random number generation method) was used to select health facilities in Mekelle city from those who provide ANC to women as health regional bureau report. Systematic random sampling was done to select participants after K was determined.

Hence, $K = N/n$ $(1647/321) = 5$, where N is the total number of pregnant women attending ANC during the data collection period and n is the total sample size. Therefore, every fifth woman was recruited based on their coming order after random selection of the first participant by lottery method.

Data collection procedure and tool. Interviewer administered structured questionnaire adapted from International Consultation on Incontinence Questionnaire Short Form (ICIQ-SF); similar studies were conducted.[14,15] ICIQ-SF consists of four sections which include questions related to the frequency, severity of urine leakage, the impact of UI on QOL, and the last section includes eight items related to symptoms to determine the type of UI. In this study, severity of urine leakage and QOL section of the ICIQ-SF were not used.[16] The following question was used to identify the presence/absence of UI. Do you have problems with involuntary leakage (loss) of urine at least once per month during your pregnancy period?

The questionnaire was written in English and translated to the local language Tigrigna, and then translated back into English to ensure its consistency. The data collectors and supervisors were trained prior to the actual data collection regarding the approach, objective of the study, and ethical issue. The data were collected by five female bachelor's degree midwives.

Face-to-face interview was conducted to gather relevant information on sociodemographic information and obstetric history. The prevalence of UI was identified based on self-rated report by the study subject. After verbal consent physical examination was done to measure the strength of PFM using a perineometry (pneumatic pelvic floor trainer)

by trained BSc midwives. Perineometry is an assessment tool used for assessment of the PFMs using vaginal probe to see changes in intra-vaginal pressure generated by voluntary contraction of the PFM and usually provides measurements in mmHg. It had good inter-rater reliability among pregnant women.[17,18] To measure the strength of PFM, the pregnant women were placed in the supine position with hips and knees flexed at 90°, hips abducted and covered with a sheet, then a rubber-coated transducer (probe) covered with a condom is entered 2–3 cm into the vaginal canal. Then, the transducer is inflated and the apparatus is set to 0. The patient is asked to inhale and perform maximum contraction of the PFMs while exhaling which would correspond to the readings in mmHg on the ammeter attached to the transducer (probe).[18,19]

Data quality assurance and data analysis. To ensure the quality of the data, the data collectors and supervisors were trained. The data collection tools were pre-tested on 5% of the total sample size (20) before the actual data collection to check for the accuracy of responses, language clarity, and appropriateness of the tools. Data were coded, entered, cleaned, and analyzed using SPSS version 23 software. Descriptive statistics were done for most variables in the study using statistical measurements, like frequency tables, graphs, percentages, means, and standard deviations (SDs). Bivariate logistic regression analysis was used to determine variables which had an association with UI. Variables found to have an association with UI were modeled with multivariate logistic regression to control for the effect of confounders. Multicollinarity was checked using variance inflation factor (VIF) cut-off point <10.[20] Model fitting was checked using Hosmer and Lemeshow goodness of fit test. Finally, the variables which had significant association were identified on the basis of the adjusted odds ratio (AOR), with 95% confidence interval (CI).

Ethical consideration

Ethical approval was obtained from the Mekelle University Research and Ethical Review Committee. Before completing the form, the data collectors explained the aim, method, and interview duration to the respondent, who was ensured that participation was voluntary and that refusal to participate would in no way was influenced. Verbal consent to participate in this survey was obtained from all participants, and the data were collected anonymously.

Results

Socieodemographic characteristics of the participants

Among the total of 321 study participants, 317 of them agreed to participate in this study with 98.7% response rate. The mean age of participants was 27.6 ± 5.85 years (mean ± SD), ranged from 18 to 45 years. The majority, 282 (89%), of participants were married. Of them, 118 (37.2%) participants had secondary school educational status in the past and 170 (53.6%) were house wives. About 260 (82%) participants were urban dwellers. None of the participants, 317 (100%), do PFM strengthening exercise (Table 1).

Table 1. Socio-demographic and behavioral characteristics of pregnant women attending antenatal care at public health facilities in Mekelle city, Tigray, Ethiopia, 2019 (n = 317).

Variables	Frequency (N)	Percentage
Age (years)		
18–24	110	34.7
25–29	106	33.4
30–34	62	19.6
⩾35	39	12.3
Weight (kg)		
<50	72	22.7
51–60	124	39.1
61–70	84	26.5
⩾71	37	11.7
Occupation		
House wife	170	53.6
Merchant	78	24.6
Employed	56	17.7
Daily laborer	13	4.1
Marital status		
Single	18	5.7
Married	282	89.0
Divorced/separated	10	3.2
Widowed	7	2.2
Level of education		
No education	52	16.4
Primary school	82	25.9
Secondary school	118	37.2
Diploma and above	65	20.5
Residency		
Rural	57	18.0
Urban	260	82.0
Current status of smoking		
No	311	98.1
Yes	6	1.9
Current intake of coffee		
No	106	33.4
Yes	211	66.6

Obstetric history and other characteristics of participants

Among 317 pregnant women with ANC follow-up, 187 (59%) of them were in the third trimester, 93 (29.3%) in the second trimester, and 37 (11.7%) in the first trimester. In all, 106 (33.4%) were multiparous and 127 (40.1%) of them were primigravida. A total of 82 (25.9%) had history

Table 2. Obstetric and other characteristics of pregnant women attending antenatal care at public health facilities in Mekelle city, Tigray, Ethiopia, 2019 (n = 317).

Variables	Frequency (N)	Percentage
Gestational age		
First trimester	37	11.7
Second trimester	93	29.3
Third trimester	187	59.0
Parity		
Primigravida	127	40.1
Primiparous	84	26.5
Multiparous	106	33.4
Mode of previous delivery		
C-section	51	16.1
Episiotomy	57	18.0
Spontaneous vaginal delivery	82	25.9
Multiple pregnancy		
No	300	94.6
Yes	17	5.4
Prior miscarriages		
No	252	79.5
Yes	65	20.5
Previous history of UI		
No	300	94.6
Yes	17	5.4
Current status of constipation		
No	234	73.8
Yes	83	26.2
Current status of respiratory problems		
No	264	83.3
Yes	53	16.7
Pelvic floor muscle strength		
Weak	79	24.9
Moderate	83	26.2
Strong	155	48.9

UI: urinary incontinence.

of delivery by spontaneous vaginal delivery, 57 (18.0%) with episiotomy, and 51 (16.1%) had undergone cesarean section mode of delivery. In all, 65 (20.5%) of the participants had prior miscarriage and 17 (5.4%) had previous history of UI (Table 2).

Prevalence of UI among pregnant women attending ANC

Of 317 study participants, the overall prevalence of UI among the study participants was 73 (23%) (95% CI: 17.7–28.4). From the total of participants having UI, 43 (58.9%) had SUI, 22 (30.14%) had MUI, and 8 (10.96%) had UUI. In this study, the prevalence of UI was relatively higher in second and above trimester 68 (24.3%) to those of first trimester. The prevalence of UI among multiparous women was relatively high 50 (47.2%) than primigravida women 9 (7.1%). The prevalence of UI among pregnant women who had history of miscarriage was 30 (46.2%). Among participants with UI, 45 (54.2%) had constipation during pregnancy. The prevalence of UI among participants who had respiratory problem was 30 (56.6%). Among pregnant women with UI, 34 (43.0%) had weak and 27 (32.5%) had moderate PFM strength (Table 3).

Associated factors of UI among pregnant women ANC

In the bivariate analysis at p value of <0.25, age, weight, educational status, residency, coffee intake, gestational age, parity, mode of delivery, multiple pregnancy, constipation, respiratory problem, miscarriage, and PFM strength have shown significant association with UI.

In multivariable logistic regression model, gestational age, parity, prior history of miscarriage, constipation during pregnancy, respiratory problem during pregnancy, and PFM strength were significantly associated with UI at p value of <0.05 significance level.

Pregnant women with gestational age of $\geqslant$second trimester were 9.6 times more likely to develop UI than in the first trimester (AOR: 9.6 (1.87–49.39, 95%).

Multiparous pregnant women were approximately 6.3 times more likely to have UI than primigravida women (AOR: 6.32 (1.48–27.05), 95% CI). The likelihood of UI in those women who had prior miscarriages was approximately 6 times more likely to develop UI than pregnant women who had no history of miscarriages (AOR: 6.28 (2.15–18.28), 95% CI). Prevalence of UI is about 8.2 times more likely in those pregnant women who had constipation during pregnancy (AOR: 8.23 (3.12–21.84), 95% CI). Having a respiratory problem during pregnancy was 6.3 times more likely associated with occurrence of UI (AOR: 6.31 (2.05–19.43), 95%). Pregnant women with weak PFM strength were having 7.5 times more likely to develop UI (AOR: 7.55 (2.51–22.67), 95% CI) (Table 4).

Discussion

The present institutional-based cross-sectional study was intended to assess the prevalence and associated factors of UI among pregnant women attending ANC at public health facilities in Mekelle city, Tigray, Ethiopia. The contributing factors that had statistically significant association with UI were gestational age, parity, prior miscarriage, constipation during pregnancy, respiratory problem during pregnancy, and weak PFM strength with an increased likelihood of UI.

In this study, overall prevalence of UI among pregnant women was found to be 73 (23%) with 95% CI (17.7–28.4) which is higher than reported prevalence of study done in Gondar, Ethiopia 11.4%.[13] The possible reason for this disparity might be due to difference in assessment tool and

Table 3. Prevalence of UI among pregnant women attending antenatal care at public health facilities in Mekelle city, Tigray, Ethiopia, 2019 (n = 317).

Variables	Urinary incontinence	
	No (%) n = 244	Yes (%) n = 73
Age (years)		
18–24	96 (87.3%)	14 (12.7%)
25–29	89 (84.0%)	17 (16.0%)
30–34	42 (67.7%)	20 (32.3%)
⩾35	17 (43.6%)	22 (56.4%)
Weight (kg)		
<50	61 (84.7%)	11 (15.3%)
51–60	97 (78.2%)	27 (21.8%)
61–70	66 (78.6%)	18 (21.4%)
⩾71	20 (54.1%)	17 (45.9%)
Level of education		
No education	31 (63.3%)	18 (36.7%)
Primary school	56 (73.7%)	20 (26.3%)
Secondary school	108 (85.0%)	19 (15.0%)
Diploma and above	49 (75.4%)	16 (24.6%)
Residency		
Rural	39 (68.4%)	18 (31.6%)
Urban	205 (78.8%)	55 (21.2%)
Gestational age		
First trimester	32 (86.5%)	5 (13.5%)
⩾Second trimester	212 (75.7%)	68 (24.3%)
Parity		
Primigravida	118 (92.9%)	9 (7.1%)
Primiparous	70 (83.3%)	14 (16.7%)
Multiparous	56 (52.8%)	50 (47.2%)
Mode of delivery		
C-section	40 (78.4%)	11 (21.6%)
Episiotomy	32 (56.1%)	25 (43.9%)
Spontaneous vaginal delivery	54 (65.9%)	28 (34.1%)
Multiple pregnancy		
No	237 (79.0%)	63 (21.0%)
Yes	7 (41.2%)	10 (58.8%)
Prior miscarriages		
No	209 (82.9%)	43 (17.1%)
Yes	35 (53.8%)	30 (46.2%)
UI in previous pregnancy		
No	242 (80.7%)	58 (19.3%)
Yes	2 (11.8%)	15 (88.2%)
Coffee intake during pregnancy		
No	91 (85.8%)	15 (14.2%)
Yes	153 (72.5%)	58 (27.5%)
Current status of constipation		
No	206 (88.0%)	28 (12.0%)
Yes	38 (45.8%)	45 (54.2%)
Current status of respiratory problems		
No	221 (83.7%)	43 (16.3%)
Yes	23 (43.4%)	30 (56.6%)
Pelvic floor muscle strength		
Weak	45 (57.0%)	34 (43.0%)
Moderate	56 (67.5%)	27 (32.5%)
Strong	143 (92.3%)	12 (7.7%)

UI: urinary incontinence.

most of their participants were <30 years of age which have less likelihood to develop UI. The result of this study found that the prevalence of UI was consistent with studies done in Nigeria and Turkey with prevalence range between 21.1% and 28.1%, respectively.[2,12,21,22] This similarity could be explained by the similarly in the use of definition of UI, study design, and eligibility criteria.

The findings of this study showed that the prevalence of UI was relatively lower than the findings of studies done in India, Turkey, Brazil, and Malaysia which were 75.25%, 63.8%, 71%, 40%, 42.4%, and 84.5%, respectively.[5,6,9,23–25] This observed difference in India and Turkey could be due to inclusion of third trimester only which has positive correlation with the occurrence of UI.[6,9] The additional possible explanation is that due to the increment of sample size utilized in the study done in Brazil and Turkey.[23–25] Similarly, the prevalence of UI was higher in the study done in Malaysia; the possible difference could be due to the use of different assessment tools (revised UI scale), use of self-administered questionnaire, and difference in eligibility criteria: inclusion of participants with hypertension, diabetes mellitus, and urinary tract infection which exacerbate the symptom of UI.[5] The other possible reason for the lower prevalence rate can be under-reporting due to cultural and religious barrier.[26]

The results of this study show that SUI is the most common form of UI followed by MUI and UUI (58.9%, 30.14%, and 10.96%), respectively. This finding is consistent with findings done in Spain (48%, 32.5%, and 5.9%), Ethiopia (58%, 24.5%, and 12.5%), Malaysia (64.8%, 24.8%, and 6.7%), and Australia (36.9%, 13.1%, and 5.9%), respectively.[13,27–29] The possible reason for this similarity could be intra-abdominal pressure increase during sneezing, coughing, and laughing; as a result of this, the internal pressure on the bladder exceeds the closure of urethral pressure that might be due to PFM weakness as a result of hormonal changes.

This study found that pregnant women with ⩾second trimester were 9 times more likely to develop UI compared to the first trimester (AOR: 9.6, p = 0.007). This is supported by the studies conducted at Spain (p = 0.004), Nigeria (AOR: 2.09, p = 0.011), and Turkey (AOR: 3.206, p = 0.026).[21,22,27] The possible reason could be due to increased uterine and fetal weight within the progress toward the third trimester, contributing to increased pressure on bladder and reduced capacity of bladder, which may lead to urine leakage.[8]

Regarding the parity of the participants, multiparous pregnant women were 6.3 times more likely to develop UI (AOR: 6.32, p = .013) compared with primigravida pregnant women. This is supported by the study conducted in Brazil (AOR: 4.93; p < 0.001).[25] The likely explanation might be mechanical strain during repetitive delivery may induce injuries to the muscle, fascia, and ligamentous disruption and injuries to connective and neural structures of pelvic organs.[2]

Table 4. Bivariate and multivariate logistic regression of factors associated with UI among pregnant women attending antenatal care at public health facilities in Mekelle city, Tigray, Ethiopia, 2019 (n = 317).

Variables	Urinary incontinence		COR (95% CI)	p value	AOR (95% CI)	p value
	Yes (%)	No (%)				
Gestational age						
⩾Second trimester	68 (24.3%)	212 (75.7%)	1			
First trimester	5 (13.5%)	32 (86.5%)	2.053 (.769–5.477)*	.151	9.604 (1.867–49.399)**	.007
Parity						
Primigravida	9 (7.1%)	118 (92.9%)	1			
Primiparous	14 (16.7%)	70 (83.3%)	2.622 (1.079–6.373)*	.033		
Multiparous	50 (47.2%)	56 (52.8%)	11.706 (5.379–25.478)*	<.001	6.321 (1.477–27.054)**	.013
Prior miscarriage						
Yes	30 (46.2%)	35 (53.8%)	1			
No	43 (17.1%)	209 (82.9%)	4.166 (2.314–7.499)*	<.001	6.279 (2.155–18.299)**	<.001
Current status of constipation						
Yes	45 (54.2%)	38 (45.8%)	1			
No	28 (12.0%)	206 (88.0%)	8.712 (4.853–15.640)*	<.001	8.249 (3.116–21.836)**	<.001
Current status of respiratory problems						
Yes	30 (56.6%)	23 (43.4%)	1			
No	43 (16.3%)	221 (83.7%)	6.704 (3.557–12.636)*	<.001	6.315 (2.053–19.428)**	.004
Pelvic floor muscle strength						
Weak	34 (43.0%)	45 (57.0%)	9.004 (4.302–18.842)*	<.001	7.550 (2.515–22.666)**	<.001
Moderate	27 (32.5%)	56 (67.5%)	5.746 (2.722–12.126)*	<.001	5.544 (1.682–18.278)**	.005
Strong	12 (7.7%)	143 (92.3%)	1			

COR: crude odds ratio; AOR: adjusted odds ratio.
*Significant association (on bivariate); **significant association (on multivariate), 1 = Reference.

In our study, pregnant women who had history of miscarriage were 6.2 times more likely to experience UI than who were not experiencing miscarriage (AOR: 6.28, $p < 0.001$). Likewise, study done in Turkey revealed that miscarriage had significant association on the occurrence of UI (AOR: 1.21, $p = 0.002$) and similarly study in Australia stated that history of miscarriage had times more likely to develop UI.[6,27] The possible reason might be subsequent pregnancy may result in damage to bladder sphincter which can result in UI.[6]

This study reported that pregnant women who experienced constipation were 8.2 times more likely to develop UI compared to non-constipated pregnant women (AOR: 8.25, $p < 0.001$).

Likewise, different studies done in Turkey reported that pregnant women with constipation had higher prevalence of UI than pregnant women who did not experience constipation (AOR: 4.16, $p < 0.001$ and AOR: 3.1, $p < 0.001$).[2,11] Similarly, study in Ethiopia found that pregnant women who often experienced constipation were 7 times more likely to develop UI.[13] The possible explanation might be constipation is one of the common problems during pregnancy which increases straining and pressure on PFM during defecation which results in PFM damage.[30]

Having respiratory problem and UI during pregnancy had significant association in this study. Pregnant women having respiratory problem were 6.3 times more likely to develop UI compared to pregnant women without respiratory problem (AOR: 6.31, $p = 0.004$). This was supported by the study done in Ethiopia; chronic cough/sneezing (AOR: 4.05 (1.5–10.5)) and asthma/allergies/sinusitis (AOR: 10.6 (3.4–33.2) had significant association on the occurrence of UI.[13] This might be due to increased intra-abdominal pressure during sneezing and coughing which results in increased pressure on PFM. Progressive straining on PFM might lead to involuntary loss of urine.[8]

The other significant predictors of onset of UI were strength of PFMs; women with weak pelvic muscle strength were 7.5 times at higher risk of developing UI (AOR: 7.55, $p < 0.001$) and women with moderate PFM were 5.5 times at higher risk of developing UI (AOR: 5.54, $p = 0.005$) compared with women having strong PFM strength. This implies that continent women had significantly higher PFM strength. This is consistent with studies conducted in Norway.[31] The possible explanation might be hormonal changes, increased uterine weight, and physiological weight gain of women may lead to relaxing and reduced strength of PFMs. PFM weakness increased bladder-neck and urethral mobility, which results in urethral sphincter incompetence which in turn leads to urine leakage.[8]

Conclusion

Generally, the prevalence of UI is moderate in Mekelle, Ethiopia compared to other studies. Gestational age, parity, prior miscarriage, having constipation, having respiratory

problem, and weak and moderate PFM had significant association with UI. Hence, examination of the urine incontinence could play a vital role in addressing the complications faced by women during their pregnancy. This finding will help to increase the awareness of health care workers involved in the care of pregnant women about UI and designing of intensive education programs directed toward the prevention and treatment of UI during pregnancy. Health care providers (physiotherapist, midwives, and obstetrician) need to take initiatives and support to address the problem and develop preventive and evidence-based management protocols in maternal health care facilities.

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