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The effect of spousal violence on women's health: Findings from the Stree Arogya Shodh in Goa, India

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ABSTRACT

Background: Spousal violence has wide-ranging effects on the physical, reproductive, sexual and psychological health of women. There are few longitudinal studies that describe this association in developing countries. Aim: To test the hypothesis that spousal violence is an independent risk factor for a broad range of adverse health outcomes in women. Setting and Design: A population-based cohort study of women living in the catchment area of a primary health center in north Goa. Two thousand four hundred and ninety-four of 3000 randomly selected women were recruited of whom 1750 married women were included for this paper. Materials and Methods: Each participant was assessed at baseline with a structured interview for the assessment of exposure to spousal violence (verbal, physical, sexual) over two time periods (lifetime; recent in the past three months). The interview collected data on gynecological complaints and the Revised Clinical Interview Schedule was used for the diagnosis of depressive disorder. Laboratory tests for anemia and sexually transmitted infections (STI) were carried out. Longitudinal data was collected after six and 12 months on these outcomes. In addition, baseline measures for nutritional status and menstrual health were also obtained. Statistical Analysis: Univariate analyses were carried out on the cross-sectional and longitudinal data to assess the association between each type of spousal violence and each health outcome. Multivariate analyses adjusted for age, literacy, household per capita income. Logistic regression was used for all analyses in Stata (Version 10). Results: Lifetime spousal violence was reported by 290 (16.6%, 95%CI = 14.9-18.4) women; recent violence was reported by 230 (13.0%, 95%CI = 11.6-14.8). The cross-sectional data showed an association between violence and a range of self-reported gynecological complaints, low Body Mass Index, depressive disorder and attempted suicide. The longitudinal analyses confirmed these associations only for STI and attempted suicide. Conclusion: Spousal violence is specifically associated as an independent risk factor for two adverse women's health outcomes, viz., STI and attempted suicide. Public health and clinical programs targeting these outcomes must specifically address spousal violence.

KEY WORDS: Cohort, depression, domestic violence, family violence, India, sexually transmitted disease, suicide, women

Received	: 02-08-08
Review completed	: 04-09-08
Accepted	: 30-09-08
PubMed ID	: 18953151

J Postgrad Med 2008;54:306-12

Spousal violence is a global phenomenon which disproportionately affects women in all societies. The National Family Health Survey (NHFS-3) conducted under the stewardship of the Ministry of Health and Family Welfare, Government of India, reported that more than a third of women (34%) between the ages of 15 to 49 years have experienced spousal physical violence.[1] The adverse health consequences that women experience due to violence are wide-ranging and encompass physical, reproductive and sexual and mental health outcomes.[2] Sexual violence, in addition, is associated with a range of gynecological consequences including pain during sexual intercourse, sexually transmitted infections (STI), increased risk of HIV and poor perinatal outcomes. The mental health problems associated with exposure to spousal violence include depression, post-traumatic stress disorder, substance abuse and suicidal behaviors.[3] Women exposed to violence have an increased risk of premature mortality due to the direct effects of trauma and due to increased risk of suicide.[4]

There are very few population-based studies which have described the association of spousal violence with a broad range of women's health outcomes in India. Furthermore, all these population-based studies are cross-sectional in design; such studies suffer limitations such as the risk of reverse causality and recall bias. In addition, little is known about how different types of violence i.e. physical, psychological, or sexual can affect health outcomes. This paper seeks to address this gap by using data obtained from the Stree Arogya Shodh ("Women's Health Project" in Konkani), a population-based longitudinal study of women's health in Goa, India which aimed to explore

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the relationship between psychosocial factors and reproductive and sexual health. The baseline recruitment component of the study enables us to test associations between different types of spousal violence and adverse health outcomes in a cross-sectional design. The longitudinal component enables us to determine the effect of spousal violence at baseline on a range of health outcomes assessed six and 12 months after recruitment, adjusting for socio-demographic confounders. We hypothesized that spousal violence would be an independent predictor of adverse women's health outcomes in both the cross-sectional and longitudinal analyses.

Materials and Methods

The Stree Arogya Shodh was a community-based study of common health problems affecting women aged 18 to 50 years, conducted in the state of Goa, India, between 2001 and 2004. The overall aim of the study was to describe the burden and determinants of common health problems in women of reproductive age and in doing so, to test the hypothesis that social and psychological factors increased the risk of reproductive and sexual health problems.

Sample

The study population was women aged 18-50 years living in the catchment area of the Aldona primary health center in the north Goa district (n=8595). The sampling frame was based on the population registers maintained by the health department. Three thousand women were randomly selected using the SPSS program. Subjects were approached in two stages; first, community level awareness programs were held in each village and community level consent obtained from village leaders. Next, women who had been randomly selected were sent letters informing them of their selection; a visit to their homes was scheduled a week or so later, at which time consent to participate was requested. The eligibility criteria for recruitment at the time of the visit were age between 18 and 50 years; residence in the area for the following 12 months; speaking one of the study languages; not suffering from cognitive impairment which would make responding to the interview and giving informed consent difficult; and not being currently pregnant. If the selected woman did not meet any of these criteria, or if the woman was no longer living in the area, then the researcher was instructed to replace her using *a priori* criteria. Women who participated were reviewed twice (at six and 12 months) after recruitment.

Data collection

The two mandatory requirements for participation in each round were a face to face interview with a trained researcher, and the collection of biological samples for the diagnosis of STI. Seventeen researchers were involved in collecting data. The researchers were either graduates or postgraduates from varied disciplines such as social science, basic sciences, the humanities, etc. The composite interview was available in two primary languages of English and Konkani. Hindi and Marathi-speaking women were interviewed by researchers fluent in these languages. The interview consisted of a composite of questions eliciting data on different aspects of the woman's personal and health history. Blood samples were collected by trained field workers or laboratory technologists. Vaginal specimens were collected by either self-administered swabs or, if women consented to a medical examination, a gynecologist. Data was collected mainly at two sites, in the woman's own home or in one of the clinics run by the study group (including the main clinic in Aldona PHC and the outreach clinics run in sub-centers). Data collected were organized as follows for the analyses presented in this paper.

a) *Assessment of exposure:* For all currently married women, the lifetime experience of verbal, physical and sexual violence by the spouse was elicited. Women who had experienced lifetime violence were then asked about exposure in the three months prior to the interview (i.e. recent exposure). The questions used were:

- Verbal violence: Sometimes husbands/partners get angry and abuse their wives. Has your husband/partner ever spoken to you using language that is threatening (for e.g. that he was going to hit you) or abusive (e.g. called you names, accused you of having relations with other men, etc)?
- Physical violence: Has your husband/partner ever hit you (Examples to probe: slap, hit, kick, pinch, pull your hair, etc)
- Sexual violence: Has your husband/partner ever forced you to have sex with him i.e. made you have sex against your wishes?

b) *Assessment of confounders:* Age, household per capita income, literacy (whether able to read and write).

c) *Assessment of outcomes:* Gynecological complaints (abnormal vaginal discharge, dysuria, dyspareunia, non-menstrual lower abdominal pain) were assessed using standardized questions.[5] The Revised Clinical Interview Schedule (CIS-R), a structured interview for the measurement and diagnosis of common mental disorders in community settings, was administered.[6] The CIS-R data was processed using the PROQSY software to generate an ICD 10 diagnosis of depressive disorder. The CIS-R also had a series of questions assessing suicidal behaviour. The Konkani version of the CIS-R used in the present study had been earlier field tested for use in Goa. This version was modified to prepare Hindi and Marathi language versions.

Biological sample collection comprised two vaginal swabs and/or urine specimens. STIs were diagnosed in a single laboratory using the following gold standard tests: polymerase chain reaction (PCR) assay for chlamydial and gonococcal infection and culture for *trichomonas vaginalis* infection.

In addition, during the first round (recruitment), data were collected on menstrual health; hemoglobin estimation was carried out based on a finger prick sample of blood using the Hemocue system; and for women who consented to an optional gynecological examination, weight and height were measured

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and Body Mass Index (BMI) estimated with these data.

Details of the data collection procedure and the tools used can be found in other publications arising from this study.[7-13]

Analysis

The analyses presented in this paper are restricted to women who were currently married at the time of recruitment. The following health outcomes were defined:

- *Abnormal vaginal discharge:* A discharge which the woman felt was abnormal due to its color, odor or volume during the previous three months
- *Dysuria:* Pain or burning during micturition during the previous three months
- Non-menstrual lower abdominal pain during the previous three months
- *Dyspareunia:* Pain or bleeding during intercourse during the previous three months
- *Dysmenorrhea:* Experiencing moderate to severe lower abdominal pain around the menstrual period, during the previous 12 months (only at baseline)
- *Attempted suicide:* Lifetime experience was assessed at baseline and during the past 12 months at follow-up
- *Depressive disorder:* Currently suffering from a depressive or anxiety disorder as defined by the International Classification of Diseases (Version 10).
- *Anemia:* Hemoglobin of less than 11 grams/dl (only at baseline)
- *Sexually transmitted infection (STI):* Current infection with any one or more of the three STIs tested (Chlamydia, Gonorrheae, Trichomoniasis)
- *Low Body Mass Index (BMI):* BMI<20 (only at baseline)

All outcomes were recorded into binary variables where required. Analyses were carried out for all these outcomes at baseline; longitudinal analyses were carried out for the gynecological complaints, mental health outcomes and STI, excluding women who already had these health outcomes at baseline. Thus the outcomes represent new/incident cases. First, univariate analyses were carried out to assess the association between each type of spousal violence (during the lifetime and in the past three months) and each health outcome. Second, we used logistic regression to adjust for our a *priori* confounders (age, literacy, household per capita income) in the association between spousal violence and health outcomes. Odds ratios and 95% confidence intervals are presented to estimate the association between spousal violence and health outcomes. Logistic regression was used for these analyses in Stata (Version 10).

Ethical considerations

The study received ethical approval from the ethical committee of the London School of Hygiene and Tropical Medicine, and from the Independent Ethics Commission, Mumbai (India); there was no institutional review board in the primary Goan implementing organization at the time the study was conducted. All participants were offered free care by the study gynecologists and psychologists, as appropriate. Referrals were made to the psychiatrist (VP) when necessary.

Results

Of the 3000 women selected for the study, 2494 (83.1%) consented to participate and were assessed at baseline. Of the 506 women who refused to participate, nine had agreed to the interview but refused the collection of biological samples. On multivariate analysis we found the following variables were independently associated with refusal to participate: higher education, Christian religion, being an ethnic Goan, and being single. The commonest reasons cited for refusal to participate were lack of interest in the study, refusal of permission by family members to participate, concerns about damage to the hymen by vaginal swabs in unmarried girls and having to attend work daily therefore lack of time. A community outreach worker involved in the study liaised with government health workers to approach those who refused to participate and attempted to further explain the study and its aims to them. For the purpose of this paper, we included only the 1750 women who were married at the time of recruitment in our analyses. The characteristics of the recruited sample have been described elsewhere.[8] Of the 1750 married women, majority were Hindu (73%), homemakers (76%) and literate (83%); the mean age was 35.37 years (sd 6.6). Most participants lived in homes that belonged to the family (87%). Less than half the homes had a toilet or piped water. More than half of the households had a monthly income below Rs 3000 and more than a third were in debt. We were able to obtain longitudinal data on 90% of women (n=1563).

Table 1 shows the prevalence of each type of spousal violence and the common health outcomes recorded at baseline and the 12-month incidence of selected health outcomes. Out of 1750 women, 290 (16.6%; 95%CI=14.9-18.4) reported one or more form of lifetime spousal violence and 230 (13%; 95%CI=11.6-14.8) reported one or more form of spousal violence in the past three months. Verbal violence was the most common, followed by physical and sexual violence. Dysmenorrhea, low BMI and anemia were the most frequent health problems observed at baseline while non-menstrual abdominal pain was the commonest health problem that developed during the 12-month study period.

Lifetime exposure to any type of violence was associated with increased risk of a range of self-reported gynecological complaints at baseline [Table 2], though associations were not consistent for all outcomes. Thus, for example, dysmenorrhea was only associated with lifetime sexual violence. After adjustment, all types of violence (lifetime and recent) were independently associated with dyspareunia. Verbal and sexual violence (lifetime and recent) were associated with non-menstrual lower abdominal pain and abnormal vaginal discharge.

All types of violence, either lifetime or in the past three months, were found to be strongly associated with depressive disorder and attempted suicide; these associations remained strong after adjustment for confounders (OR between 3.36 to 6.41, for depression; OR between 2.93 to 7.21, for attempted suicide) [Table 3]. In addition, both verbal and physical violence (lifetime and recent) were found to increase the risk of low BMI

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Table 1: Frequency of exposures and outcomes in married women aged 18-50 years

Exposures	Prevalence n	%	Confidence intervals
Lifetime verbal violence	259	14.80	13.17 – 16.55
Lifetime physical violence	165	9.43	8.10 – 10.90
Lifetime sexual violence	64	3.66	2.83 – 4.65
Verbal violence in past 3 months	202	11.54	10.08 – 13.13
Physical violence in past 3 months	101	5.77	4.73 – 6.97
Sexual violence in past 3 months	53	3.03	2.28 – 3.94
Outcomes at baseline (Duration)	**Prevalence n**	**%**	**Confidence intervals**
Abnormal vaginal discharge (Previous 3 months)	238	13.60	12.02 – 15.30
Dysuria (Previous 3 months)	186	10.63	9.22 – 12.17
Non-menstrual lower abdominal pain (Previous 3 months)	273	15.60	13.93 – 17.39
Dyspareunia (Previous 3 months)	101	5.77	4.73 – 6.97
Dysmenorrhea (Previous 12 months) (n=1542)	456	29.57	27.3 – 31.91
STI (Current) (n=1689)	83	4.91	3.93 – 6.56
Depressive disorder (Current)	128	7.31	6.14 – 8.64
Attempted suicide (Lifetime)	45	2.57	1.88 – 3.43
Low BMI (Current) (n=1396)	402	28.80	26.43 – 31.25
Anemia (Current) (n=1745)	336	19.26	17.43 – 21.18
Longitudinal outcomes	**12-month incidence n**	**%**	**Confidence intervals**
Abnormal vaginal discharge (n=1355)	86	6.35	5.11 – 7.78
Dysuria (n=1476)	111	7.52	6.23 – 8.99
Non-menstrual lower abdominal pain (n=1394)	175	12.55	10.86 – 14.41
Dyspareunia (n=1541)	45	2.92	2.14 – 3.89
STI (n=1498)	43	2.87	2.09 – 3.85
Depressive disorder (n=1466)	33	2.25	1.55 – 3.15
Attempted suicide (n=1537)	9	0.59	0.27 – 1.11

n=1750, unless otherwise noted, BMI: Body mass index, STI: Sexually transmitted infections

but not anemia or STI.

The longitudinal analyses [Tables 4 and 5] found that spousal violence recorded at baseline increased the subsequent risk of dysuria, STI and attempted suicide. Dysuria was associated only with lifetime physical violence, STI only with sexual violence (both lifetime and recent) and attempted suicide with physical and sexual violence (both lifetime and recent). These associations remained statistically significant after adjustment for confounders. None of the other outcomes we assessed (depressive disorder and other self-reported gynecological complaints) showed an association with any of the violence exposures.

Discussion

We describe the association between spousal violence and a broad range of women's health problems, spanning both self-reported complaints and biomedical diagnoses related to nutritional status, reproductive and sexual health and mental health. We tested the hypothesis that spousal violence is a risk factor for these outcomes through analyses of cross-sectional and longitudinal data collected from married women aged 18 to 50 years in a population-based cohort study in Goa, India. About one in six married women in our sample experienced spousal violence at some point in their life; about 80% of these women also experienced recent violence (in the three months prior to recruitment). Although spousal violence was associated with a number of adverse health outcomes in cross-sectional analyses, the strengths of these associations were attenuated on adjustment for sociodemographic confounders. Furthermore, on longitudinal analyses, the associations between spousal violence and health outcomes were restricted to sexually transmitted infections and attempted suicide.

We consider the possibility of a causal role for spousal violence by examining whether the Bradford Hill criteria[14] can be applied to our findings. First, we consider the strength of the associations we have found; a stronger association (as indicated by the size of the odds ratios) indicates a greater likelihood of a cause-effect relationship. The largest odds ratios were observed for dyspareunia, non-menstrual lower abdominal pain and both

Table 2: Cross-sectional associations between spousal violence and self-reported gynecological complaints

	Abnormal vaginal discharge		Dysuria		Non-menstrual lower abdominal pain		Dyspareunia (n=1542)		Dysmenorrhea	
	Univ	Adj*	Univ	Adj*	Univ	Adj*	Univ	Adj*	Univ	Adj*
Lifetime exposure										
Verbal violence	1.37 (0.96-1.96)	1.44 (1.00-2.08)	1.68 (1.15-2.46)	*1.51 (1.03-2.23)*	*2.29 (1.68-3.13)*	*2.16 (1.56-2.97)*	*2.23 (1.40-3.54)*	*2.42 (1.50-3.91)*	1.29 (0.95-1.74)	1.21 (0.89-1.65)
Physical violence	1.15 (0.73-1.80)	1.16 (0.73-1.84)	*1.85 (1.19-2.86)*	*1.64 (1.04-2.59)*	1.34 (0.89-2.02)	1.20 (0.79-1.84)	2.39 (1.41-4.04)	2.55 (1.47-4.43)	1.30 (0.90-1.87)	1.11 0.76-1.62
Sexual violence	1.83 (0.99-3.36)	*1.91 (1.02-3.56)*	1.21 (0.57-2.58)	1.16 (0.54-2.51)	*2.38 (1.37-4.14)*	*2.37 (1.35-4.16)*	*5.70 (3.07-10.56)*	*6.38 (3.35-12.14)*	*1.83 (1.07-3.14)*	*1.89 (1.09-3.29)*
Exposure in past 3 months										
Verbal violence	1.45 (0.98-3.13)	1.50 (1.00-2.25)	*1.63 (1.07-2.47)*	1.46 (0.95-2.24)	*2.50 (1.78-3.50)*	*2.34 (1.66-3.31)*	*2.58 (1.59-4.18)*	*2.80 (1.69-4.63)*	*1.42 (1.02-1.98)*	1.33 (0.94-1.87)
Physical violence	1.41 (0.83-2.39)	1.42 (0.82-2.44)	*1.91 (1.12-3.26)*	1.72 (1.00-2.98)	1.46 (0.88-2.40)	1.32 (0.79-2.19)	*2.89 (1.58-5.29)*	*3.08 (1.64-5.78)*	1.25 (0.79-1.98)	1.06 (0.66-1.71)
Sexual violence	1.91 (0.99-3.68)	1.95 (0.99-3.82)	1.29 (0.57-2.90)	2.25 (0.55-2.84)	*3.17 (1.78-5.65)*	*3.21 (1.78-5.77)*	*7.39 (3.92-13.96)*	*8.38 (4.30-16.33)*	1.73 (0.97-3.11)	1.72 (0.95-3.14)

n=1750, unless otherwise noted, Univ: Univariate, Adj: Adjusted, *Adjustments are made for age, literacy and household per capita income, Associations in italics are statistically significant at $P<0.05$

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Table 3: Cross-sectional associations between spousal violence and disorder outcomes

	Low BMI		Anemia		STI		Depressive disorder		Attempted suicide	
	Univ	Adj*	Univ	Adj*	Univ	Adj*	Univ	Adj*	Univ	Adj*
Lifetime exposure										
Verbal violence	*1.87 (1.9-2.53)*	*1.66 (1.21-2.29)*	0.92 (0.66-1.30)	0.85 (0.60-1.20)	1.65 (0.96-2.83)	1.40 (0.80-2.44)	*4.33 (2.95-6.36)*	*3.36 (2.44-5.39)*	*4.91 (2.68-8.97)*	*4.12 (2.19-7.77)*
Physical violence	*1.98 (1.38-2.84)*	*1.58 (1.07-2.33)*	1.06 (0.71-1.59)	0.96 (0.64-.46)	1.67 (0.88-3.14)	1.37 (0.71-2.63)	*4.97 (3.26-7.57)*	*3.95 (2.55-6.3)*	*7.80 (4.22-14.44)*	*6.66 (3.42-12.95)*
Sexual violence	1.43 (0.82-2.52)	1.37 (0.77-2.48)	0.77 (0.39-1.53)	0.73 (0.37-1.46)	1.38 (0.49-3.89)	1.21 (0.42-3.48)	*6.11 (3.45-10.80)*	*5.33 (2.96-9.60)*	*7.50 (3.44-16.33)*	*7.21 (3.17-16.39)*
Exposure in past 3 months										
Verbal violence	*1.98 (1.43-2.75)*	*1.70 (1.20-2.41)*	1.08 (0.75-1.56)	0.99 (0.68-1.45)	*2.07 (1.18-3.60)*	1.75 (0.99-3.11)	*4.65 (3.12-6.96)*	*3.80 (2.51-5.76)*	*4.99 (2.68-9.29)*	*4.04 (2.10-7.76)*
Physical violence	*2.33 (1.50-3.36)*	*1.92 (1.20-3.07)*	1.11 (0.67-1.82)	1.01 (0.61-1.67)	*2.31 (1.15-4.62)*	1.92 (0.94-3.91)	*5.59 (3.44-9.08)*	*4.45 (2.69-7.36)*	*3.75 (1.70-8.28)*	*2.93 (1.27-6.74)*
Sexual violence	1.25 (0.66-2.34)	1.11 (0.57-2.15)	0.97 (0.48-1.96)	0.93 (0.46-1.88)	1.22 (0.37-3.99)	1.05 (0.32-3.51)	*7.42 (4.07-13.53)*	*6.41 (3.45-11.92)*	*6.64 (2.82-15.66)*	*6.18 (2.51-15.24)*

n=1750, unless otherwise noted, Univ: Univariate, Adj: Adjusted, *Adjustments are made for age, literacy and household per capita income, Associations in italics are statistically significant at $P<0.05$, BMI: Body mass index, STI: Sexually transmitted infections

Table 4: Longitudinal associations between spousal violence and self-reported gynecological complaints

	Abnormal vaginal discharge		Dysuria		Non-menstrual lower abdominal pain		Dyspareunia	
	Univ	Adj*	Univ	Adj*	Univ	Adj*	Univ	Adj*
Lifetime exposure								
Verbal violence	1.13 (0.61-2.08)	1.05 (0.56-1.96)	1.60 (0.98-2.61)	1.52 (0.92-2.51)	1.11 (0.70-1.76)	1.05 (0.65-1.67)	1.15 (0.51-2.62)	1.11 (0.70-1.76)
Physical violence	1.35 (0.68-2.68)	1.06 (0.52-2.06)	*2.19 (1.27-3.75)*	*2.15 (1.22-3.76)*	1.11 (0.65-1.90)	1.00 (0.57-1.74)	1.63 (0.68-3.92)	1.41 (0.57-3.53)
Sexual violence	2.30 (0.95-5.60)	2.34 (0.94-5.78)	1.35 (0.53-3.48)	1.26 (0.48-3.27)	1.20 (0.50-2.90)	1.13 (0.46-2.76)	1.65 (0.39-7.05)	1.74 (0.40-7.61)
Exposure in past 3 months								
Verbal violence	1.15 (0.58-2.28)	1.05 (0.52-2.11)	*1.82 (1.08-3.08)*	1.69 (0.99-2.88)	1.18 (0.71-1.97)	1.08 (0.64-1.82)	1.59 (0.70-3.63)	1.53 (0.65-3.58)
Physical violence	1.37 (0.58-3.25)	1.06 (0.44-2.58)	1.68 (0.82-3.47)	1.61 (0.77-3.38)	1.37 (0.72-2.60)	1.20 (0.63-2.32)	2.37 (0.91-6.17)	2.15 (0.80-5.82)
Sexual violence	1.77 (0.61-5.11)	1.69 (0.58-4.98)	1.69 (0.65-4.40)	1.57 (0.60-4.14)	1.35 (0.51-3.56)	1.26 (0.46-3.28)	1.04 (0.14-7.78)	0.98 (0.13-7.50)

Univ: Univariate, Adj: Adjusted, *Adjustments are made for age, literacy and household per capita income, Associations in italics are statistically significant at $P<0.05$

Table 5: Longitudinal associations between spousal violence and disorder outcomes

	STI (n=1498)		Depressive disorder (n=1466)		Attempted suicide (n=1537)	
	Univ	Adj*	Univ	Adj*	Univ	Adj*
Lifetime exposure						
Verbal violence	1.02 (0.42-2.44)	1.00 (0.41-2.42)	1.57 (0.64-3.85)	1.27 (0.51-3.17)	3.28 (0.81-13.23)	3.89 (0.91-16.53)
Physical violence	1.70 (0.70-4.09)	1.69 (0.68-4.19)	1.18 (0.35-3.93)	0.88 (0.26-3.00)	*5.71 (1.41-23.12)*	*7.97 (1.75-36.37)*
Sexual violence	*3.94 (1.48-10.47)*	*3.70 (1.36-10.05)*	1.12 (0.15-8.38)	0.88 (0.12-6.72)	*9.20 (1.86-45.53)*	*10.91 (2.01-59.30)*
Exposure in past 3 months						
Verbal violence	0.65 (0.20-2.13)	0.62 (0.19-2.05)	0.97 (0.29-3.22)	0.75 (0.22-2.53)	2.59 (0.53-12.56)	2.84 (0.55-14.73)
Physical violence	1.94 (0.68-5.58)	1.88 (0.64-5.53)	0.65 (0.09-4.81)	0.50 (0.07-3.79)	*5.46 (1.12-26.72)*	*6.56 (1.19-35.99)*
Sexual violence	*4.78 (1.78-12.80)*	*4.55 (1.66-12.49)*	1.41 (0.19-10.67)	1.09 (0.14-8.36)	*11.20 (2.25-52.72)*	*12.91 (2.32-71.80)*

Univ: Univariate, Adj: Adjusted, *Adjustments are made for age, literacy and household per capita income, Associations in italics are statistically significant at $P<0.05$, BMI: Body mass index, STI: Sexually transmitted infections

mental health outcomes. Second, we assessed the temporality of the association. The cross-sectional analyses show that spousal violence increases the risk of a range of gynecological complaints, being under-nourished (but not anemic) and mental health problems. Most of the cross-sectional associations we reported were not confirmed on longitudinal analyses, with the important exception of STIs (specifically associated with sexual violence) and attempted suicide. Furthermore, the association with the risk for STI was restricted to recent exposure to sexual violence. However, we did not carry out comparable

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longitudinal analyses of dysmenorrhea, low BMI and anemia and thus cannot comment on the temporality of these associations. Third, we examined if there was a dose-response relationship between the exposure (assuming that there was an increasing gradient of severity for verbal to physical to sexual violence) and the health outcomes; we were able to demonstrate such an association for dyspareunia and mental health outcomes in the cross-sectional analyses, and STI and attempted suicide in the longitudinal analyses. We conclude, therefore, that spousal violence is specifically associated as a causal factor in the etiology of two major adverse health outcomes, viz., STIs and attempted suicide.

There are very few comparable longitudinal studies from developing countries and, to the best of our knowledge, none from India. The WHO Multicentre study on domestic violence and women's health highlighted the cross-sectional association between violence and women's sexual and reproductive health including sexual risk behaviors.[15] A retrospective cohort study from the US reported that incident STI during pregnancy were significantly associated with history of sexual violence after adjustment for age, ethnicity and marital status.[16] This association of violence and STI/RTI has also been described using data from the National Family Health Survey -2 from Kerala state in southern India.[17] The association between violence and STI gains additional significance in light of the findings of a community-based study from southern India that reported low treatment-seeking behavior in women with RTI/STI due to stigma, embarrassment and lack of knowledge.[18] This is a reflection of the low status of women that makes them further susceptible to family violence. Another prospective study from Australia reported an increased risk of abnormal Pap smear and vaginal or endo-cervical infection in women reporting intimate partner violence.[19] The WorldSafe study conducted in four countries (Chile, Egypt, India and Philippines) reported on the mental health consequences of intimate partner violence and found that violence increased risk of attempted suicide in all the communities studied.[20] Our study clearly indicates the strong temporal contribution of violence to the risk of attempted suicide. Depression has been identified as an important consequence of spousal violence in many cross-sectional studies, including in our study and the WHO Multicentre study on domestic violence and women's health.[7, 16] However, we were unable to demonstrate an association between violence and depression in our longitudinal analyses. This may be either because the rates of violence were lower in our sample than in other studies from India[21] and because the association between violence and depression reported in surveys is attributable to recall bias and reverse causality.

We acknowledge a number of limitations of our data which may limit the confidence with which we can interpret our findings. The generalizability of our findings is limited as we have focused on marital relationships alone, and our definitions of violence are highly specific (for example, sexual violence refers only to forced sexual intercourse). Since violence was measured only at baseline, it is uncertain if violence in the interim follow-up period may have preceded the change in health outcomes. Our analyses adjusted for only the three most important confounders i.e. age, income and literacy, leaving it possible that there is residual confounding; we think that this would only further diminish the strength of association between violence and health outcomes. A source of potential bias in this study is the degree of accuracy with which women have been classified with respect to their exposure to violence and their health outcomes. While the outcomes were unlikely to have been misclassified since they were either self-reported symptoms or quality-controlled measurements and laboratory tests, misclassification of exposure to violence may have occurred. Many women may hesitate to admit to a sensitive issue such as spousal violence. This misclassification may have obscured the association between violence and health problems in the longitudinal analysis. However, we do not know of any other reliable method for ascertaining women's exposure to violence. Furthermore, our research team was highly trained and had established strong trusting relationships with multiple stakeholders in the community. Selection bias is a possibility as 16.9% of the randomly selected women refused to participate and about 10% of women were lost during follow-up. Finally, the small number of events for some outcomes limited the power of our study, as evidenced by large confidence intervals, to detect associations which were statistically significant.

Despite these limitations, our study is important and unique due to its population-based sampling, its longitudinal design, and its assessment of multiple types of violence exposures over different time periods (lifetime and recent) and the assessment of multiple health outcomes reflecting both biomedical disorders and self-reported complaints. Our results show that spousal violence is a causal factor for two serious adverse health outcomes in women, viz. attempted suicide and STI. While a meta-analysis of the risk of mental disorders in women exposed to domestic violence has been conducted and Campbell's paper provides a comprehensive view of the health consequences of violence, it would be useful to systematically review the topic to better inform health planning and policy-makers.[2,3] Public health interventions seeking to reduce attempted suicide and STI in married women must address spousal violence as a critical risk factor for these adverse health outcomes. While the Aldona area does have women's groups which provide support and assistance to victims of family violence, it is necessary in such settings to establish referral networks between healthcare providers and legal/government organizations who can provide further redressal when needed.

Furthermore, it is important to consider the role of violence in women presenting to the health services with either STI or attempted suicide and to provide evidence-based interventions for reducing further exposure to violence.[22]

Acknowledgments

We acknowledge the role of the Directorate of Health Services, the Sangath research team and the women of Aldona in enabling this study.

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Source of Support: This study was funded by the Wellcome Trust through a Career Development Fellowship awarded to VP,
Conflict of Interest: Not declared.