

# Web Appendix 1: Study Quality Checklist

## Guidelines and checklist for appraising a medical article

<i>Guideline</i>	<i>Checklist</i>		
1. Study design appropriate to objectives?	Objective	Common design	<input type="checkbox"/>
	Prevalence	Cross-sectional	<input type="checkbox"/>
	Prognosis	Cohort	<input type="checkbox"/>
	Treatment	Controlled trial	<input type="checkbox"/>
	Cause	Cohort, case-control, cross-sectional	<input type="checkbox"/>
2. Study sample representative?	Source of sample		<input type="checkbox"/>
	Sampling method		<input type="checkbox"/>
	Sample size		<input type="checkbox"/>
	Entry criteria/exclusions		<input type="checkbox"/>
	Nonrespondents		<input type="checkbox"/>
3. Control group acceptable?	Definition of controls		<input type="checkbox"/>
	Source of controls		<input type="checkbox"/>
	Matching/randomization		<input type="checkbox"/>
	Comparable characteristics		<input type="checkbox"/>
4. Quality of measurement and outcomes?	Validity		<input type="checkbox"/>
	Reproducibility		<input type="checkbox"/>
	Blindness		<input type="checkbox"/>
	Quality control		<input type="checkbox"/>
5. Completeness?	Compliance		<input type="checkbox"/>
	Drop outs		<input type="checkbox"/>
	Deaths		<input type="checkbox"/>
	Missing data		<input type="checkbox"/>
6. Distorting influences?	Extraneous treatments		<input type="checkbox"/>
	Contamination		<input type="checkbox"/>
	Changes over time		<input type="checkbox"/>
	Confounding factors		<input type="checkbox"/>
	Distortion reduced by analysis		<input type="checkbox"/>

++ = Major problem, + = Minor problem, 0 = No problem, NA = Not applicable

Source: Fowkes FG, Fulton PM. Critical appraisal of published research: introductory guidelines. BMJ (Clinical research ed). 1991 May 11;302(6785):1136–1140.

**Web Appendix 2: Summary of Included Primary Studies on Risk Factors for Dysmenorrhea**

Study ID, Country	Population	Prevalence/incidence <sup>a</sup>	Primary outcome	Significant risk factors	Effect estimates	Confidence interval <sup>b</sup> / p value
Longitudinal study						
Ohde et al (2008) (1) Japan	823 randomly sampled women aged 18-51 years Follow-up: 1 month	Incidence: 15.8%:(95% CI 13.3, 18.3)	Presence of dysmenorrhea	Age <30 years Employed	RR 2.25 RR 1.62	1.50, 3.37 1.10, 2.40
Wang et al (2004) (2) China	388 female textile workers, aged 20-34 years and nulliparous	Incidence: 28% Prevalence: 44.4%	Presence of dysmenorrhea	Self-perceived stress during preceding cycle (vs low stress)  High stress  High stress + dysmenorrhea in preceding cycle	  OR 2.4  OR 3.6	  1.4, 4.3  1.7, 7.8
Weissman et al (2004) (3) USA	404 nursing students or graduates with primary dysmenorrhea, aged ≥19years Follow-up: 6 years	Primary: 75% (mild 53%, moderate 20%, severe 2%)	Moderate-severe primary dysmenorrhea	Parity (increment of 1 birth)  Age (increment of 1 year)	OR 0.70  OR 0.94	0.54, 0.91  0.90, 0.99
Community-based cross-sectional study						
Abenhaim & Harlow (2006) (4) USA	904 women not using OCP, aged 36-44 years	36.7%	Moderate-severe pain	Livebirth (vs 0)  1  2  3+	  OR 0.4  OR 0.4  OR 0.3	  0.3, 0.7  0.2, 0.6  0.2, 0.5
Burnett et al (2005) (5) Canada	1546 menstruating women from a stratified random sample, aged ≥18 years	Primary: 60% Limiting activity: 15% with mild & 51% with moderate-severe pain	Presence of primary dysmenorrhea	Age Smoking Oral contraception pills	$\beta$ =-0.96 $\beta$ =1.30 $\beta$ =-0.72	p<0.001 p=0.046 p=0.017
Harlow et al (2002) (6) USA	976 women with intact uteri, aged 36-44 years	NR	Cycle pain change from the 1st 5 years after menarche to late reproductive years	Tubal ligation		
				Became better (vs no change)	OR 0.9	0.5, 1.5
				Became worse (vs no change)	OR 1.4	0.8, 2.4
				Tubal ligation > 5 years ago		
				Became better (vs no change)	OR 1.1	0.6, 2.2

Study ID, Country	Population	Prevalence/incidence <sup>a</sup>	Primary outcome	Significant risk factors	Effect estimates	Confidence interval <sup>b</sup> / p value
				Became worse (vs no change)	OR 1.9	0.9, 4.1
Laszlo et al. (2008) (7) Hungary	2722 working women from a nation-wide representative random sample, aged <55 years	15.5% with painful menstruation limiting activity	Presence of dysmenorrhea limiting activity	<i>Work stress measured by</i> Control at workplace (vs none) Medium High Co-worker-support (vs none) Medium High High job security (vs low)	 OR 0.67 OR 0.66  OR 0.62 OR 0.51 OR 0.63	 0.49, 0.91 0.47, 0.95  0.46, 0.83 0.35, 0.76 0.42, 0.95
Laszlo et al. (2009) (8) Hungary	821 pre-menopausal, non-pregnant working women, mean age about 38 years	20.1% painful menstruation limiting activity	Presence of dysmenorrhea limiting activity	<i>Work stress measured by</i> Effort-reward imbalance Over commitment	 OR 1.42 OR 1.07	 1.03, 1.94 1.02, 1.13
Nohara et al. (2011) (9) Japan	2166 Japanese female workers who are menstruating	78.3% (2.8% very serious pain, 25.8% serious pain, 49.7% tolerable pain)	Severe-very severe pain	Age (increment of 1 year) BMI (vs 18.5-25 kg/m <sup>2</sup> ) Parity (vs 0) Stress (vs no/very little/somewhat stress):	 OR 0.94 OR 1.42 OR 0.70 OR 1.46	 0.93, 0.96 1.12, 1.80 0.52, 0.94 1.13, 1.87
Patel et al. (2006) (10) India	2262 randomly selected women, aged 18-45 years not on OCP	54.7% (mild 21.3% (95% CI 19.6, 23.0), moderate to severe 33.4% (95% C:I 31.4, 35.5))	Moderate-severe pain	Age (vs 18-24 years), p<0.001 30-34 34-40 40-50 Age at menarche (vs ≤12 years), P=0.01 13-14 15+ Ever pregnant	 OR 0.54 OR 0.46 OR 0.43  OR 0.75 OR 0.70 OR 0.53	 0.4, 0.8 0.3, 0.7 0.3, 0.6  0.6, 0.9 0.5, 0.9 0.4, 0.7

Study ID, Country	Population	Prevalence/incidence <sup>a</sup>	Primary outcome	Significant risk factors	Effect estimates	Confidence interval <sup>b</sup> / p value
				Menorrhagia Somatoform symptom score <sup>c</sup> (vs 0-1), p<0.001 2-3 4-7 >7 Violence from others	OR 1.92  OR 1.21 OR 2.63 OR 3.67 OR 2.23	1.4, 2.6  0.9, 1.6 2.0, 3.4 2.7, 4.9 1.5, 3.4
Pawlowski (2004) (11) Mexico	177 non-smoking women living in the Mayan village, aged 18-45 years	28%	Presence of dysmenorrhea	Age at birth of first child	OR 1.15	1.02, 1.30
Pitts et al. (2008) (12) Australia	1983 menstruating women from a random sample, aged 16-49 years, sexually active, not been pregnant in the previous 12 months	71.7%, among them 15% (95% CI 13.0, 17.1) severe pain	Presence of dysmenorrhea	Age (vs 40-49 years) 16-19 20-29 30-39 English spoken (vs other) Even been pregnant Ever had a live birth	OR 2.74 OR 1.58 OR 1.49 OR 2.02 OR 0.74 OR 0.74	1.49, 5.04 1.18, 2.12 1.18, 1.89 1.21, 3.38 0.55, 0.99 0.56, 0.97
Santer et al. (2005) (13) UK	2833 women, aged 25-44 years not using IUCD, random sampled from 19 general practices	Severe pain 15% (95% CI 13-16), of which 2% very severe	Severe-very severe pain	Parity (per child, vs 0) Deprivation area (per unit increase) Longstanding illness Hormonal contraception (vs other excl IUCD)	OR 0.87 OR 1.30 OR 1.73 OR 0.25	0.77, 0.98 1.18, 1.43 1.33, 2.23 0.18, 0.35
Tavallaee et al. (2011) (14) Iran	276 women, aged 16-56 years not having secondary dysmenorrhea, from a stratified random sample	Primary: 91% (mild 41%, moderate 28%, severe 22%)	Presence of dysmenorrhea	Age SES (vs very low) Less than average Average	OR 0.91  OR 0.08 OR 0.06	0.79, 0.92  0.00, 0.80 0.00, 0.70

Study ID, Country	Population	Prevalence/incidence <sup>a</sup>	Primary outcome	Significant risk factors	Effect estimates	Confidence interval <sup>b</sup> / p value
				More than average Fruits & veg (vs never/low) High Very high Depressed most of the time (vs never) Family history of dysmenorrhea	OR 0.05  OR 0.40 OR 0.20 OR 13.3 OR 3.8	0.00, 0.90  0.20, 0.60 0.08, 0.50 2.0, 86.0 2.20, 6.90
Unsal et al. (2010) (15) Turkey	729 reproductive age women recruited from two family physicians, aged 15-49 yrs,	63.6%	Presence of dysmenorrhea	No of birth (vs >3) 0 1-2 Irregular menstruation Family history of dysmenorrhea	OR 7.83 OR 2.33 OR 1.90 OR 20.73	4.21, 14.57 1.32, 4.11 1.22, 32.95 11.48, 37.42
Systematic review						
Latthe et al (2006) (16)	64,286 women (from 63 studies) provided information on dysmenorrhea. No details on patients' characteristics were reported. Note that all multiple studies are reported to be heterogeneous	NR	Presence of dysmenorrhea	Age < 30 years (3 studies) BMI < 20 kg/m <sup>2</sup> (5 studies) High SES (2 studies) Smoking (11 studies) Fish intake (1 study) Exposure to cold at work (2 studies) Slaughterhouse work (1 study) Textile mill work (1 study) Earlier menarche (6 studies) More pregnancies/parity (12 studies) Age at birth of first child (1 study) Miscarriage (4 studies)	OR 1.89 OR 1.42 OR 1.25 OR 1.37 OR 0.37 OR 2.20 OR 2.54 OR 2.05 OR 1.54 OR 0.64 OR 0.38 OR 1.29	1.36, 2.63 1.26, 1.59 1.04, 1.50 1.19, 1.57 0.18, 0.73 1.31, 3.70 1.33, 4.86 1.30, 3.24 1.17, 2.04 0.57, 0.72 0.18, 0.83 1.05, 1.59

Study ID, Country	Population	Prevalence/incidence <sup>a</sup>	Primary outcome	Significant risk factors	Effect estimates	Confidence interval <sup>b</sup> / p value
				Irregular menses (2 studies)	OR 2.02	1.19, 3.44
				Duration of menstrual flow (5 studies)	OR 2.38	1.69, 3.3.7
				Heavy menstrual blood loss (3 studies)	OR 4.73	2.95, 7.58
				Premenstrual syndrome (6 studies)	OR 2.42	1.84, 3.18
				Sterilisation (5 studies)	OR 1.35	1.04, 1.75
				Oral contraceptive use (10 studies)	OR 0.65	0.60, 0.71
				Pelvic inflammatory disease (2 studies)	OR 1.58	1.09, 2.30
				Circumcision (1 study)	OR 3.75	1.46, 9.67
				Sexual assault (4 studies)	OR 1.60	1.29, 2.00
				Emotional difficulties (1 study)	OR 2.18	1.45, 3.27
				Psychological symptoms (1 study)	OR 3.72	2.10, 6.60
				Suicidal tendency (1 study)	OR 2.45	1.48, 4.05
				No-sensuality (1 study)	OR 8.12	3.37, 19.54
				Somatisation (3 studies)	OR 3.04	1.42, 6.53

Abbreviations: NR, not reported; OR, odds ratio; RR, rate ratio; SES, socioeconomic status

<sup>a</sup>. rates are prevalence rates unless otherwise specified

<sup>b</sup>. confidence intervals are reported as 95% CI in all primary studies, except the systematic review by Latthe (2006) where 99% CIs were reported to account for possible multiple testing

<sup>c</sup>. range 0-40, higher score indicates worse mental health

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