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Diagnostic delay and health-related quality of life in Egyptian women with endometriosis

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Abstract

Background Firstly, to measure indicators of health-related quality of life (HRQoL) in Egyptian women with endometriosis; and secondly, to estimate time interval from start of symptoms until endometriosis diagnosis is made (diagnostic delay) in Egyptian women with the disease.

Material and methods Before laparoscopy for pelvic pain and/or infertility, eligible Egyptian women completed Global Study of Women's Health (GSWH) questionnaire and validated Arabic version of Rand SF 36 (SF-36). According to laparoscopic findings, participants were divided to endometriosis group and control women with no pelvic abnormalities.

Results Seventy women with endometriosis and 57 symptomatic controls without endometriosis were enrolled. A diagnostic delay of 36 months (IQR 22.5–60) was observed in women with endometriosis while symptomatic controls had a delay of 48 months (IQR 24–84). The difference was not statistically significant ($P=0.08$). Bodily pain (BP) scores were significantly lower in women with endometriosis than controls [80.0 (45.0–100.0) versus 100.0 (68.75–100.0) respectively, P is 0.01]. Women with advanced endometriosis had significantly lower scores for physical functioning (PF), role limitation due to physical function (RP), and BP compared to women with mild endometriosis, and to controls. Physical component summary (PCS) scores were significantly lower in women with advanced stage endometriosis [41.51 (34.19–51.54] compared to women with early-stage disease [58.33 (50.98–60.37)] or control group [54.72 (48.81–59.58)]. Patient's age, intensity of noncyclical pelvic pain, and disease stage are determining factors of HRQoL in women with endometriosis.

Conclusions Egyptian women with endometriosis experience relatively short diagnostic delay, poor bodily pain scores, and impaired physical health for which age, disease stage, and non-cyclic pain are determinants. Multi-disciplinary endometriosis centers, educational programs, and patient support groups are needed in Egypt.

Keywords Quality of life, Diagnostic delay, Endometriosis, Egypt

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Background

Endometriosis is a menstrual cycle dependent, chronic, inflammatory, systemic disease that presents primarily with pelvic pain. It affects 2–10% of women of reproductive age leading to variable forms of pelvic pain, and subfertility [1]. Because of the heterogeneity of symptoms, and invasiveness of the diagnostic modality, i.e., laparoscopy, women with endometriosis experience a variable diagnostic delay [2]. During this time, women with endometriosis lose days at college and/or work, suffer from lowered self-esteem, have disturbed relationships, and often feel their pains will never disappear, which may erode their confidence in their physicians. These effects negatively impact women's productivity, professional perspectives, emotional wellbeing, and social lives [3].

Health-related quality of life (HRQoL) encompasses physical health, mental state, and social wellbeing in relation to a disease or its treatment [4]. Endometriosis has been shown in several studies to impair nearly all aspects of HRQoL in affected women [4, 5]. However, some of the previous studies suffered important limitations including not using a validated HRQoL tool, an inadequately selected control group, not considering diagnostic delay and disease stage as factors affecting HRQoL, and focusing mainly on Western populations.

Women perceive menstruation, menstrual problems, and endometriosis symptoms in a way specific to their culture, values, and beliefs. Arab women with endometriosis showed lower mental and physical health components compared to women in other communities [6]. In a conservative society like Egypt, menstruation and related events represent a taboo enveloped by a culture of secrecy [7]. Similarly, infertile women are often stigmatized by their family/ community [8]. Despite having a special cultural background, Egyptian women, particularly those in the more conservative community of the south, were underrepresented in studies investigating effect of endometriosis on HRQoL.

Therefore, in the current study, conducted in the south of Egypt, we measure different domains of HRQoL in Egyptian women with endometriosis using a validated Arabic version of SF-36. We also assess determinant factors of HRQoL in these women. In addition, we evaluate the diagnostic delay experienced by Egyptian Women with endometriosis.

Material and methods

The present study was part of a larger research project, funded by Science and Technology Development Fund (STDF), Egyptian Ministry of Higher Education, parts of which have already been published [9, 10]. We recruited 70 women with endometriosis (39 women with early-stage endometriosis, and 31 women with advanced stage disease) and 57 symptomatic controls without endometriosis in the period from December 2014 to May 2016.

Study design and settings

This cross-sectional survey was conducted at the Women's Health Hospital, University of Assiut, in the South of Egypt.

Study participants

Reproductive age women (18–45 years) scheduled for laparoscopy to investigate their pelvic pain and/or infertility, were asked to participate in the study. Exclusion criteria were prior endometriosis diagnosis (whether confirmed with surgery or imaging), pelvic pathology other than endometriosis, hormonal treatment within the last 3 months, or pregnancy/lactation in the previous 6 months before surgery.

Sample size calculation

Endometriosis is commonly associated with various forms of chronic pelvic pains (dysmenorrhea, dyspareunia, non-cyclic pelvic pain, cyclic dyschezia and dysuria). In addition, women with endometriosis have higher risk of multi-site pain co-morbidities (fibromyalgia, migraines, rheumatoid arthritis, and osteoarthritis). Moreover, bladder pain syndrome/interstitial cystitis and irritable bowel syndrome are commonly co-occurring with endometriosis [11]. We assumed that women with endometriosis may have higher impairment in the domain of bodily pain compared to even the symptomatic controls.

According to the SF-36 manual and interpretation guide [12], detecting a 10-point difference in bodily pain between women with endometriosis and controls requires 71 cases per group, at a two tailed alpha of 0.05 and power of 80%.

Ethical approval

The research protocol was approved by the Science and Technology Development Fund (STDF), which is a part of the Egyptian Ministry of Higher Education in 2014. Additional approval was obtained by The Institutional Review Board at the Faculty of Medicine, University of Assiut, (IRB# 17,400,008) in February 2018 to use the data for publication.

Informed consent

A research team member (MYK) explained the study in details and its objectives to the participants and obtained their verbal informed consent to take part in the study. Another researcher (ERO) assured participants about

data anonymity to protect the confidentiality of their information and double checked that participants gave their verbal informed consent.

Interview

Early in the morning, on the day of laparoscopy, participants were interviewed by a member of the research team to complete two questionnaires: Global Study of Women's Health questionnaire (GSWH) [3], which was completed by the researcher interviewing the patient, and the validated Arabic version of Rand SF-36 questionnaire [13], which was completed by the patient herself if literate enough. Otherwise, the researcher read and explained questions to the patient and recorded her responses after read-back.

Questionnaires

- Global Study of Women's Health (GSWH) questionnaire: which is a 67-item questionnaire on presenting symptoms, physical functioning, medical, and reproductive history, time since start of symptoms and health resource use [3]. The GSWH questionnaire incorporates questions and instruments previously validated for women with pelvic pains or other symptom groups. These include Short Version-36 V2 (SF-36 v2), The Work Productivity and activity Impairment (WPAI) questionnaire, the IRB Rome III questionnaire to assess pelvic pain due to irritable bowel and standardized pelvic pain symptom assessment used in previous studies in Oxford [14].
- Short version-36 (SF-36) is a tool used to assess general health related quality of life. Arabic translation of this questionnaire is available that has already been validated [13]. Other disease-specific questionnaires like Endometriosis Health Profile-30 (EP-30) and Endometriosis Health Profile-5 (EP-5) have not been translated to Arabic Language. The SF-36 questionnaire consists of 36 questions that are grouped into 8 main domains over the last four weeks. These include Physical functioning (FP; 10 items), Role limitation due to physical function (RP; 4 items), Role limitation due to emotional factors (RE; 3 items), Vitality (VT; 4 items), Mental Health (MH; 5 items), Social Functioning (SF; 2 items), Bodily Pain (BP; 2 items), General Health (GH; 5 items), and perception of health in comparison to the last year (1 item). Each item response is given a raw score based on SF-36 manual. Raw scores are then summated to give domain scores ranging from 0 to 100 where 0 means lowest quality of life and 100 indicates best quality of life. In addition, the 8 domain scores are combined to produce physical component summary (PCS) score (derived from PF, RP, BP, GH), and mental component summary (MCS) score (derived from RE, MH, SF, VT) [12, 13]. All psychometric measures of SF-36 validation are available in the SF 36 Health Survey: Manual and Interpretation Guide [12].

Using the GSWH questionnaire allowed us to systematically capture the demographic and clinical characteristics of study participants; including structured menstrual/reproductive history, detailed symptoms, and the diagnostic delay. Adding SF-36 questionnaire permitted the measure of different domains of the participants' HR-QoL which were ultimately summated into PCS and the MCS scores.

- Calculation of the diagnostic delay: Women were asked to self-report the earliest age at which they experienced endometriosis-related symptoms (infertility or various forms of pelvic pain). Time interval that lapsed between age at onset of symptoms and age at which endometriosis was surgically diagnosed represented the actual diagnostic delay [3, 6].

Surgical diagnosis of endometriosis

Endometriosis was diagnosed during laparoscopy according to typical morphologic features of the lesions. Women whose laparoscopic examination revealed a normal pelvis were classified as idiopathic infertility/pelvic pain and served as the control group. Laparoscopies were performed in the proliferative phase of the menstrual cycle by experienced surgeons. During surgery, endometriosis was scored according to the revised American Society of Reproductive Medicine (ASRM) scoring system. Endometriosis was rated as either minimal (stage I), mild (stage II), moderate (stage III), or severe (stage IV). Menstrual dates were assessed based on patient's menstrual history.

Statistical methods

All statistical analysis in the current study was done using Social Package of Social Scientists (SPSS), version 21 (IBM Corp, Armonk, NY, USA) statistical software. Kolmogorov-Smirnov test and the Shapiro-Wilk test were used to examine the distribution of data. Clinical and demographic data were expressed as mean ± standard deviation (SD) except for number of living children, duration of infertility, Numerical Rating Score (NRS) for dysmenorrhea, deep dyspareunia, and non-cyclic pelvic pain, and diagnostic delay in which data were expressed as median and interquartile range (IQR). SF-36 domain scores in women with endometriosis and controls were not normally distributed, so,

non-parametric statistics were used, and scores were expressed as median ± IQR. Mann-Whitney *U* test was used to compare women with endometriosis versus symptomatic controls. Kruskal-Wallis test was used to compare scores across early-stage endometriosis, advanced stage endometriosis, and symptomatic controls. Pairwise comparisons among the 3 groups were done with Mann-Whitney *U* test and Bonferroni correction. Statistical significance was considered if *P* value ≤ 0.05. To identify determinants that are associated with low PCS, and MCS in women with endometriosis, a multiple logistic regression model was developed in which both component summary scores were dichotomized; either below or above their respective median value (given score 1 or 0, respectively), and considered as the dependent variable. Clinical factors (age, BMI, parity, time since start of symptoms, endometriosis stage, numerical rating scale (NRS) for dysmenorrhea, dyspareunia, and non-cyclic pelvic pain) were incorporated in the model as independent variables [15].

Results

1. Patients' characteristics and results of clinical/surgical evaluation of recruited women are shown in Tables 1 and 2 respectively.

2. Diagnostic delay experienced by Egyptian women with endometriosis:

   A diagnostic delay of 36 months (IQR 22.5–60) was observed in women with endometriosis while symptomatic controls had a delay of 48 months (IQR 24–84). The difference was not statistically significant ($P=0.08$), as seen in Table 2. Women complaining of infertility represented 44.3% of endometriosis group, and 87.7% of symptomatic control women.

3. SF-36 domain scores in women with endometriosis and symptomatic controls:

Table 1 Characteristics of study participants

Item	Endometriosis $N=70$	Control women $N=57$	*P* value
Demographics			
Age (years)	28.56 ± 5.72	28.96 ± 5.7	0.690
BMI (kg/m^2)	25.32 ± 4.5	27.34 ± 4.29	0.011
Urban (*N*, %)	9 (12.9%)	7 (12.3%)	0.922
Rural (*N*, %)	61 (87.1%)	50 (87.7%)	
Number of living children	0.0 (0.0–1.0)	0.0 (0.0–0.0)	0.047
Marital status			
Currently married	65	56	0.185
Virgin	4	0	
Divorced/separated	1	1	
Indication of surgery (*N*, %)			
Infertility	31 (44.3%)	50 (87.7%)	< 0.001
Pelvic pain	16 (23.0%)	6 (10.5%)	
Infertility + Pelvic pain	11(15.7%)	1 (1.8%)	
Ovarian cysts (*N*, %)	5 (7.1%)	0	
Others (*N*, %t)	7 (10%)	0	
Duration of infertility (years)	3.0 (0.0–5.0)	4.0 (2.0–7.0)	0.048
Menstrual days (*N*, %)			
< 2 days	0	1 (1.8%)	0.532
2–7 days	69 (98.5%)	55 (96.4%)	
> 7 days	1 (1.5%)	1 (1.8%)	
Cycle length			
< 24 days	0	3 (5.3%)	0.068
24–35 days	62 (88.6%)	52 (91.2%)	
Infrequent (> 35 days)	7 (10%)	1 (1.8%)	
Too irregular (metrorrhagia)	1 (1.4%)	1 (1.8%)	

Table 2 Clinical/surgical evaluation and diagnostic delay in study participants

	Endometriosis (*N* = 70)	Controls (*N* = 57)	*P* value
Intensity of pelvic pain (NAS)			
Dysmenorrhea	7.0 (0.0–9.0)	0.0 (0.0–5.0)	0.001
Dyspareunia	2.0 (0.0–6.5)	0.0 (0.0–5.0)	0.214
Non-cyclic pain	0.0 (0.0–6.0)	0.0 (0.0–6.0)	0.312
Endometriosis stage: (*N*, percent)			
Stages I/II endometriosis	39 (56%)	N/A	
Stages III/IV endometriosis	31 (44%)	N/A	
Diagnostic delay: (months since start of symptoms)			
Diagnostic delay (in months; median and IQR)	36 (22.5–60)	48 (24–84)	0.080

NAS numerical analogue scale

As depicted in Table 3, women with endometriosis had significantly lower scores for the BP domain than symptomatic controls [80.0 (45.0–100.0) versus 100.0 (68.75–100.0) respectively, *P* is 0.01] indicating poorer quality of life in this domain. No statistically significant difference was detected between women with endometriosis and symptomatic controls in other domains of the SF-36.

4. SF-36 domain scores in women with endometriosis stratified by stage of the disease:

   A shown in Table 4, women with stages III/IV endometriosis had significantly lower scores for PF [85.0 (50–100.0)] , RP [25.0 (0.0–75.0)], and BP [55.0 (35.0–85.0)], compared to women with stages I/II disease [corresponding scores for PF, RP, and BP are: 95.0 (85.0–100.0), 100.0 (25.0.0–100.0), and 100.0 (70.0–100.0), respectively] and to control women (corresponding scores are: 95.0 (82–100.0), 100.0 (0.0–100.0), and 100.0 (68.7–100.0), respectively). For the domain of GH, women with stages III/IV endometriosis scored significantly less than women with stages I/II disease [60.0 (45.0–85.0) versus 85.0 (70.0–90.0) respectively, *P* is 0.001).

5. Physical component summary (PCS) and mental component summary (MCS):

   PCS and MCS for women with endometriosis and symptomatic controls were calculated according to the SF-36 manual [12]. These are standardized combined scores with a mean of 50, and standard deviation of 10. According to our results, neither PCS nor MCS differed significantly between women with endometriosis and controls (Table 3). Breaking down endometriosis group by disease stage showed that women with stages III/IV endometriosis had significantly lower PCS scores compared to women with stages I/II disease or control group (Table 4). On the other hand, there was no significant difference in MCS scores between different stages of endometriosis or control women (Table 4).

6. Determinants of low PCS and MCS scores in women with endometriosis:

Table 3 SF-36 domain scores in women with endometriosis patients and controls. Data expressed as median and interquartile range (IQR)

SF-36 items	Endometriosis (*N* = 70)	Controls (*N* = 57)	*P* value
Physical Functioning (PF)	95.0 (73.75–100.0)	95.5 (82.0–100.0)	0.366
Role limitation due to physical function (RP)	62.5 (0.0–100.0)	100.0 (0.0–100.0)	0.261
Role limitation due to emotional factors (RE)	66.7 (0.0–100.0)	66.7 (0.0–100.0)	0.722
Vitality (VT)	70.0 (50.0–85.0)	70.0 (50.0–82.5)	0.850
Mental Health (MH)	62.0 (40.0–76.0)	60.0 (40.0–76.0)	0.894
Social Functioning (SF)	50.0 (50.0–50.0)	50.0 (50.0–62.0)	0.265
Bodily Pain (BP)	80.0 (45.0–100.0)	100.0 (68.75–100.0)	0.016
General Health (GH)	75.0 (60.0–86.25)	75.0 (55.0–90.0)	0.739
Physical Component Summary (PCS)	51.7 (41.34–58.99)	54.73 (48.81–59.58)	0.088
Mental Component Summary (MCS)	42.05 (30.58–48.63)	38.82 (29.47–46.03)	0.529

Table 4 SF-36 domain scores in early (stages I/II) and advanced (stages III/IV) endometriosis. Data expressed as median and interquartile range (IQR)

SF-36 items	Mild Endometriosis (Stages I and II) $N=39$	Advanced endometriosis (Stages III and IV) $N=31$	Control women $N=57$	*P* value		
				Mild endo. vs. control	Mild vs. severe endo	Severe endo. vs. control
Physical Functioning (PF)	95.0 (85.0–100.0)	85.0 (50–100.0)	95.0 (82–100.0)	1.00	0.020	0.056
Role limitation due to physical function (RP)	100.0 (25.0.0–100.0)	25.0 (0.0–75)	100.0 (0.0–100.0)	1.00	0.002	0.011
Role limitation due to emotional factors (RE)	100.0 (0.0–100.0)	33.3 (0.0–100.0)	66.6 (0.0–100.0)	0.32		
Vitality (VT)	70 (55.0–90.0)	65.0 (50.0–80.0)	70.0 (50.0–82.5)	0.48		
Mental Health (MH)	60.0 (40.0–76.0)	64.0 (36.0–76.0)	60.0 (40.0–76.0)	0.98		
Social Functioning (SF)	50.0 (50.0–50.0)	50.0 (37.5–50.0)	50.0 (50.0–62.5)	0.24		
Bodily Pain (BP)	100.0 (70.0–100.0)	55.0 (35.0–85.0)	100.0 (68.7–100.0)	1.00	< 0.001	< 0.001
General Health (GH)	85.5 (70.0–90.0)	60.0 (45.0–85.0)	75.0 (55.0–90.0)	0.145	0.003	0.260
Physical Component Summary (PCS)	58.33 (50.98–60.38)	51.52 (34.20–51.54)	54.73 (48.81–59.59)	0.868	< 0.001	< 0.001
Mental Component Summary (MCS)	37.8 (29.49–49.20)	43.3 (32.93–47.01)	38.82 (29.47–46.03)	0.789		

A multi-logistic regression model was developed with PCS/ MCS scores are the dependent variables (dichotomized, with score below and above their respective median given the code 1 and 0, respectively), and participants' demographic/clinical factors as the independent variables. Our model has shown that age (OR: 1.22, CI: 1.01–1.49, *P* value: 0.036), NRS for non-cyclic pelvic pain (OR: 1.93, CI: 1.27–2.95, *P* value: 0.002), and advanced stage endometriosis (OR: 28.9, CI: 3.9–218.09, *P* value: 0.001) are associated with low PCS scores in women with endometriosis. No specific determinants were significantly associated with low MCS scores in the group of women with endometriosis (Table 5).

Discussion

Our results show that Egyptian women with endometriosis experienced a relatively short diagnostic delay and had poorer bodily pain scores compared to symptomatic controls. Patient's age, intensity of non-cyclic pelvic pain, and advanced disease stage are determining factors of physical health in Egyptian endometriosis patients.

Egyptian women were underrepresented in previous research on endometriosis-related HRQoL. SF-36, which performs well in evaluation of HRQoL in endometriosis,

Table 5 Multiple logistic regression analysis of PCS/ MCS scores (as dependent variables) and participants' clinical/demographic criteria (as independent variables) in Egyptian women with endometriosis

Independent variable	*PCS*			*MCS*		
	Odds ratio	95 Confidence interval (CI)	*P* value	Odds ratio	95 Confidence interval (CI)	*P* value
Age	1.22	1.01–1.49	0.036	1.15	0.92–1.11	0.744
BMI	0.92	0.76–1.10	0.362	0.95	0.85–1.07	0.418
Time since start of symptoms	0.98	0.96–1.009	0.240	0.98	0.97–1.005	0.180
Dysmenorrhea (NAS)	0.76	0.55–1.02	0.074	0.94	0.78–1.11	0.442
Dyspareunia (NAS)	1.12	0.85–1.47	0.391	1.10	0.92–1.32	0.291
Non-cyclic pelvic pain (NAS)	1.93	1.27–2.95	0.002	1.16	0.96–1.39	0.112
Number of living children	1.31	0.63–2.74	0.464	0.83	0.50–1.36	0.466
Endometriosis stage (stages III/IV versus stages I/II)	28.9	3.9–218.09	0.001	0.62	0.21–1.82	0.384

NAS numerical analogue scale

was used in this study [16]. We investigated factors like patient's age, diagnostic delay, symptom severity, and disease stage for their influence on HRQoL. Using symptomatic controls likely has prevented overestimation of the negative effect of endometriosis on HRQoL compared to if the control group had consisted of healthy asymptomatic women. A point of strength in our study is that all endometriosis cases and symptomatic controls were surgically evaluated.

A possible explanation of the occurrence of diagnostic delay in Egyptian women with endometriosis is the common culture of menstrual taboo, with subsequent normalization of symptoms by families and society [7] as well as limited availability of reproductive health education [17], particularly knowledge about endometriosis, among Egyptian females [18]. Therefore, educational programs for adolescents about endometriosis as a part of the school curriculum [19], as well as incorporating the disease into national clinical guidelines and fostering multi-disciplinary collaborations in endometriosis care, may lead to more awareness for endometriosis and may favorably impact diagnostic delay [20].

Studies addressing the length of the diagnostic delay in women with endometriosis have reported delays up to nearly 11 years which may vary among centers and countries [3, 21–23].

As laparoscopy is highly subsidized (and consequently affordable) in Egyptian governmental hospitals, this may encourage gynecologists to order it early when investigating infertility/pelvic pain as hallmarks of endometriosis. This practice may contribute to the relative short delay in diagnosis of 36 months in Egyptian women with endometriosis when compared to studies in other countries [3].

This is not in line with previous research which showed that state-funded health care systems, compared to self- or insurance funded counterparts, usually results in longer diagnostic delay [3].

However, similar diagnostic delay, ranging between 2 and 3.7 years, as found in our study, were reported in Chinese, European, and American women [3, 24, 25].

The high prevalence of infertility in our cohort of women with endometriosis might have contributed to the relatively short diagnostic delay. Prior studies showed that the time to diagnosis is shorter in women with endometriosis associated infertility compared to patients with pain related symptoms for seeking medical help [2, 25, 26]. Among general practitioners, this translates as the sense of urgency to establish a timely diagnosis and to offer treatment of endometriosis in order to prevent future infertility [20].

Prior studies conducted on different populations showed that women with endometriosis have impairments in different domains of SF-36 when compared to symptomatic controls [3, 27]. In addition, Nnoaham and coworkers found that women with moderate/advanced stage endometriosis had significantly lower PCS scores than women with minimal/mild disease [3]. Our results support these findings.

Two other studies investigated Egyptian women with endometriosis. One study found that endometriosis patients with adhesions had lower HRQoL scores than endometriosis women lacking them [28]. This study included infertile women with stage III endometriosis only, with no control group, and the authors used the Global Quality of Life scale, which is not validated for endometriosis, and does not recognize domains of impairment. The second study used SF-12, and EHP-5 to measure HRQoL in endometriosis patients. Again, the study was not controlled, the Arabic version of the EHP-5 used was not validated in an independent study, the EHP-5 results were reported only as percentages, without actual scores, and the SF-12 scores were not mentioned [29].

Mousa et al. [6] found that the collective PCS and MCS were lower in Arab women with endometriosis compared to symptomatic and asymptomatic controls. Moreover, women with endometriosis suffered a diagnostic delay of 11.61 years [6]. Although we could not identify a significant difference in MCS scores between endometriosis patients and symptomatic controls, we showed that MCS scores in both groups were below the population average, which is similar to Mousa et al.'s findings. We and Mousa et al. used the normative value of the US population for comparison due to lack of normative values of these scores in Egypt or the Middle East [6]. Our sample size was much smaller than the Mousa et al. study; however, we focused on more homogeneous population in terms of ethnicity and cultural characteristics (Egyptian women), rather than different Arab nationalities. Furthermore, most recruited women in Mousa et al.'s study were educated and employed (around 60%). In our study, 87% of women came from rural areas. Such women are generally less well educated or even illiterate and are housewives. These differences in population characteristics may account for the variability in findings. In addition, in the Mousa et al.'s study, 67% of women with endometriosis had chronic pelvic pain in comparison to only 23% in our study. This difference in clinical presentation might have affected care seeking behavior of women in that study. As we depended in our study on participants' recalling of when their symptoms started, it is also possible that the lower level of education in our participants might have increased their recall bias [30].

Our results showed that in Egyptian women with endometriosis, higher patient's age was associated

with lower PCS score of the SF-36 scale. Prior research showed younger age was associated with poorer domains in SF-36. However, the collective PCS and MCS scores were not reported or correlated to age [31].

Endometriosis effects on HRQoL were not always related to disease stage [5]. However, our results, in agreement with Nnoaham and his group [3], showed advanced stage disease to be significantly associated with worse PCS scores in women with endometriosis. The association of advanced stage endometriosis with poor physical health might be explained by the presence of variable degrees of symptom severity or associated comorbidities in advanced endometriosis patients [32].

We reported non-cyclic pelvic pain intensity as a significant determinant of low PCS scores in women with endometriosis. Prior research showed that dysmenorrhea and non-menstrual pain negatively impacted HRQoL in women with endometriosis [27]. On the other hand, reduction in dysmenorrhea and non-menstrual pelvic pain using elagolix improved HRQoL and work productivity in women with endometriosis pelvic pain [33].

Our study is not without limitations. Our sample size was modest, as we could recruit 90% of the required sample size as per the SF-36 Health Survey: Manual and Interpretation Guide [12]. We did not include a control group of healthy asymptomatic women. We could not classify participants in our study according to their clinical presentation of pelvic pain or infertility due to the small number of pelvic pain cases in our endometriosis ($N=16$) and the symptomatic control ($N=6$) groups. Furthermore, a commonly cited disadvantage in observational studies from a methodological point of view is the potential for recall bias as the data are collected retrospectively. This represents an important limitation for evaluating the diagnostic delay in our study as we depended on patients memorizing when symptoms first started. Therefore, a longitudinal cohort study would be more suited to investigate the associations between HRQoL and endometriosis. Finally, we could not evaluate diagnostic delay separately at the level of general practitioner or gynecologist as the Egyptian health care system allows for patient self-selection of her health care provider [34].

In conclusion: our study has shown that Egyptian women with endometriosis experience diagnostic delay and exhibit impaired physical health scores for which patient's age, disease stage, and non-cyclic pain are significant determining factors. Multidisciplinary endometriosis care centers are needed in Egypt, together with educational programs to increase awareness about the disease. Patient support groups are important requirement to empower endometriosis patients in Egypt.

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Authors' contributions
ERO: conception of the idea, data collection, data analysis, manuscript writing. AMA: data analysis, manuscript writing. MYK: data collection, data analysis. CBL: data analysis, reviewing manuscript. VM: data analysis, reviewing manuscript.

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Availability of data and materials
The dataset used for the development of this manuscript is available from the authors upon request.

Declarations

Ethics approval and consent to participate
The research protocol was approved by the Science and Technology Development Fund (STDF), which is a part of the Egyptian Ministry of Higher Education in 2014. Additional approval was obtained by The Institutional Review Board at the Faculty of Medicine, University of Assiut, (IRB# 17400008) in February 2018 to use the data for publication.
A research team member (MYK) explained the study in details and its objectives to the participants and obtained their verbal informed consent to take part in the study. Another researcher (ERO) assured participants about data anonymity to protect the confidentiality of their information and double checked that participants gave their verbal informed consent.

Consent for publication
The manuscript does not contain any individual person data. So, consent for publication is not applicable.

Competing interests
The authors declare no competing interests.

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