Original Article

Investigation of premenstrual syndrome and contributing factors among university students*

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Aim: To determine the frequency of premenstrual syndrome (PMS) and to investigate contributing factors for PMS among female students in a university dormitory in Ordu.

Materials and methods: This descriptive study was conducted with female students at a public university dormitory in Ordu, in the East Black Sea region of Turkey. The sample contained 300 female students at the university dormitory. The study was conducted between 3 January and 12 January 2007. The research data were collected via a 22-item socio-demographic information questionnaire and the Premenstrual Syndrome Scale (PMSS) developed by Gençdoğan.

Results: It was determined that the participants' mean age was 20.56 ± 1.77. Approximately half of the girls (49.7%) had PMS. According to the PMSS subscale scores, 205 girls (68.3%) had changes in appetite, 197 (65.7%) had irritability, 196 (65.3%) had swelling, 143 (47.7%) had fatigue, 185 (61.7%) had pain, 154 (51.3%) had depressive feelings, 140 (46.7%) had changes in sleeping habits, 102 (34.0%) had depressive thoughts, and 56 (18.7%) had anxiety. It was determined that PMS mean scores increased in parallel with problems that affect the mood of the girls. The contributing factors for PMS in the girls were found to be having premenstrual and menstrual pain (P = 0.036), having mothers with PMS (P = 0.045), and having irregular menstruations after coming to university (P = 0.000).

Conclusion: Approximately half of the girls had PMS. It was determined that PMS was associated with premenstrual and menstrual pain, having a mother with PMS, and menstrual problems present after coming to university in Ordu.

Key words: Premenstrual syndrome, contributing factors, university students

Üniversite öğrencilerinde premenstrual sendrom ve etkileyen faktörlerin incelenmesi

Amaç: Bu çalışmanın amacı üniversite yurdunda kalan genç kızlarda premenstrual sendrom (PMS) sıklığını belirlemek ve PMS'yi etkileyen faktörleri incelemekti.

Yöntem ve gereç: Bu tanımlayıcı çalışma, Türkiye'nin Karadeniz Bölgesinde yer alan Ordu ili üniversite yurdunda kalan kız öğrenciler üzerinde yapıldı. Örneklem üniversite yurdundaki 300 kız öğrenciyi kapsadı. Araştırma 3-12 Ocak 2007 tarihleri arasında yapıldı. Araştırma verileri, 22-maddelik bir sosyo-demografik bilgi formu ve Gençdoğan tarafından geliştirilen Premenstruel Sendrom Ölçeği (PMSÖ) ile toplandı.

Bulgular: Kızların yaş ortalamasının 20,56 ± 1,77 olduğu belirlendi. Yaklaşık olarak kızların yarısında (% 49,7) PMS vardı. PMSÖ alt ölçek puanlarına göre, kızların 205'inde (% 68,3) iştahta değişiklik, 197'sinde (% 65,7) sinirlilik, 196'sında (% 65,3) şişkinlik, 143'ünde (% 47,7) yorgunluk, 185'inde (% 61,7) ağrı, 154'ünde (% 51,3) depresif duygular, 140'ında (% 46,7) uyku alışkanlığında değişiklik, 102'sinde (% 34,0) depresif düşünceler ve 56'sında (% 18,7) anksiyete görüldü. Kızların ruhsal durumu etkilendiğinde, PMSÖ puan ortalamalarının yükseldiği belirlendi. PMS'yi etkileyen faktörlerin premenstrual ve menstrual ağrı (P = 0,036), PMS'li anne (P = 0,045) ve üniversite eğitimi için evden ayrıldıktan sonra menstrual düzensizlikler yaşama (P = 0,000) olduğu bulundu.

Sonuç: Yaklaşık kızların yarısı PMS yaşamaktaydı. Kızlarda premenstrual ve menstrual ağrı, annede PMS olması ve üniversite eğitimi için ilk kez Ordu'ya gelindiğinde menstrual sorunlar yaşama ile PMS arasında ilişki olduğu belirlendi.

Anahtar sözcükler: Premenstrual sendrom, etkili faktörler, üniversite öğrencileri

Introduction

Premenstrual syndrome (PMS) is used to describe an array of predictable physical, cognitive, affective, and behavioral symptoms that occur cyclically during the luteal phase of the menstrual cycle and resolve quickly in a few days at the onset of menstruation (1). Over 200 premenstrual symptoms have been reported; however, very few are confined to or only explained by changes in the menstrual cycle. The terminology of premenstrual disorders has become complex (1). Premenstrual tension is the lay term that is used for PMS; premenstrual dysphoric disorder is the extreme, predominantly psychological, end of the PMS spectrum (2). The etiology and pathophysiology of PMS remain unknown. The syndrome is seen in women of reproductive age and is not present before puberty, during pregnancy, or after menopause. Elimination of the ovarian endocrine cycle by oophorectomy or by administration of analogues of GnRH is associated with the parallel suppression of PMS symptoms. The hypothesis that ovarian steroids, particularly progesterone, have a role in the pathophysiology of the syndrome is intuitively obvious (2).

There are no specific physical examination findings or lab tests specific to the diagnosis of PMS (3). A symptom calendar can help women identify the most troublesome symptoms and confirm the diagnosis of PMS (4). The organizations that have published definitions include the American Psychiatric Association (APA) and the American College of Obstetricians and Gynecologists (ACOG) (5,6). The World Health Organization's International classification of Diseases uses ICD-9 code 625.4 for Premenstrual Tension Syndrome and lists PMS and PMDD under this heading. There is no separate diagnostic code for PMS or PMDD (7). According to the current diagnostic criteria proposed by ACOG, PMS is diagnosed if at least one mental and one somatic symptom occur in moderate or intense severity (8). According to DSM IV criteria of the APA, in order to diagnose PMDD, i.e. the more severe form of the PMS, at least 5 symptoms should be present, including 1 severe mental symptom (5). There should be a meaningful change between postmenstrual and premenstrual symptom severity (9). The cyclical symptoms appear mostly during the luteal phase of the menstrual cycle and disappear shortly after the beginning of menstruation. The key diagnostic feature is that the symptoms must be absent in the time between the end of menstruation and ovulation (10).

Premenstrual symptoms are experienced by up to 95% of all women of reproductive age (2). A smaller subset meets the criteria for PMS and less than 10% are diagnosed as having PMDD. Risk factors for PMS include advancing age (beyond 30 years) and genetic factors. However, as indicated above, PMS symptoms are identified in adolescents and can begin around age 14, or 2 years post-menarche, and continue until menopause (11). Studies conducted with women in the US have revealed a relationship between PMS and increased absence from work, thus increasing the cost for employers of women with PMS (8).

We used new a scale with PMS in this study. We think that this study will add new definitions of PMS to the literature. We aimed to investigate the contributing factors for PMS and PMS among female students.

Materials and methods

This descriptive study was conducted with female students at a public university dormitory in Ordu, located in the East Black Sea region of Turkey. The research population comprised 380 young female students staying in a dormitory at a public university. The entire population was targeted for inclusion but only 300 girls (participation rate of 78.9%) who agreed to participate were included in the study.

Research data were collected with a 22-item socio-demographic information questionnaire and the Premenstrual Syndrome Scale (PMSS). The PMSS was previously developed by Gençdoğan in Turkey (12). The questionnaire form and the scale were given to 300 young female students to be completed by themselves. The questionnaire form and PMSS took approximately 20 to 25 min to complete. Permission to use the PMSS in this study was obtained from Gençdoğan, who had conducted validity and reliability tests of the PMSS. The study conformed to the principles of the Declaration of Helsinki. The young girls were invited to participate in the study and informed before verbal consent was obtained. The

researchers guaranteed participants that their identities and answers would be kept confidential.

The demographic questionnaire was used to obtain information about the girls' mothers' education status, perception of income level, family type, residence, cigarette use, anemia, adequacy and balance in nutrition, knowledge on menstruation, age at menarche, length of menstrual cycle, number of pads used, premenstrual and menstrual pain, menstrual problems before coming to university, having a mother with PMS and contributing factors for premenstrual symptoms.

The PMSS Instrument

The PMSS has 44 items. All items are scored on a 5-point Likert scale. After each item on the PMSS was read, it was marked by taking notice of "having this condition the week before menstruation". The PMSS items are scored as 1 for a response of "not any/never", 2 for "very little", 3 for "sometimes", 4 for "frequently", and 5 for "continually". There are 9 subscales on the PMSS. These are depressive feelings (items 1-7), anxiety (items 8-11, 13, 15, 16), fatigue (items 12, 14, 17, 18, 25, 37), irritability (items 19-23), depressive thinking (items 24, 26-30, 44) pain (items 31-33), changed appetite (items 34-36), changed sleep (items 38-40) and swelling (items 41-43) subscales (12). The existence of PMS was determined according to subscale scores and the total PMSS score in the original study in which the test of the validity and internal reliability of it was conducted by Gençdoğan. The PMSS score is the sum of the subscale scores. The lowest possible PMSS total score is 44 points and the highest is 220. It is hypothesized that girls who receive a total PMSS score of 111 or higher have premenstrual syndrome. When analyzing the PMSS results, PMS is considered to be present when more than 50% of the subscales and total have a high value (12).

In Gençdoğan's study, validity of the test with a similar scale was applied together with that of the Premenstrual Assessment Form (PAF), which was developed by Halbreich and Endicott, and the validity and reliability of the Turkish version was tested by Dereboy et al. (12,13). The PAF and the PMSS reliability correlation was 0.71; the 1-month interval test-retest correlation was 0.87, and item total score correlation was 0.35-0.78 (P < 0.001). Cronbach's

Alpha coefficient of PMSS items was 0.75 while those of its subscales were between 0.75 and 0.91. In factor analysis, 9 factors were determined to explain the variance by 70.51%. PMSS findings reveal that the scale is valid and reliable in evaluating the premenstrual symptoms (12). In our study, Cronbach's alpha coefficient of PMSS was found to be 0.94 while those of its subscales were between 0.73 and 0.89.

Frequencies, percentages, arithmetic mean, standard deviation, and chi square test in SPSS 11.5 were used for data analysis.

Results

Through the analysis of the participating girls' socio-demographic characteristics, it was determined that their mean age was 20.56 ± 1.77, and their mean age at menarche was 13.38 ± 1.20. Of the participants, 23.7% (n = 71) were in the school of nursing, mothers of 59.7% (n = 179) had primary school education, and 56.3% (n = 169) rated their income as "sufficient". The majority (n = 260; 86.7%) of the participants were in a nuclear type of family and half (n = 148; 49.3%) were from cities. In this study, 16.3% (n = 49) of the girls smoked cigarettes regularly, and 27.3% (n = 82) had anemia. In the evaluation of menarche and menstruation characteristics of the girls, it was determined that 82.7% (n = 248) received information about menstruation before menarche, and the age of menarche for 77.6% (n = 233) was 13 and higher. It was determined that 46.7 % (n = 140) of the girls had a menstrual cycle between 28 and 35 days and 43.0% (n = 130) stated that they used 11-20 sanitary pads during their menstruation. Premenstrual and menstrual pain were reported by 207 (85.7%) of the girls. During the first few months after leaving home and going to university, 130 (43.3%) of the girls had PMS. More than half (n = 173; 57.7%) of the girls' mothers had one or more PMS symptom. In the analysis of contributing and alleviating factors for PMS, it was determined that cold weather (43.3%; n = 130), having an important exam (39.0%; n = 117), and family problems (28.3%; n = 85) were contributing factors to PMS. The methods used to alleviate symptoms of PMS were taking analgesics by 50.7% (n = 152), resting by 42.0% (n = 126), and keeping warm

by 38.3% (n = 115). Only 11 (0.7%) of the girls saw a physician because of pain.

The girls' PMSS scores are shown in Table 1. Half (n = 149; 49.7%) of the girls had a PMSS score of 111 or higher. The PMSS mean score for this group was 138.34 ± 18.23.

In Table 2, the total PMSS score and mean scores of subscales with rates of girls' points taken higher than 50% are shown. Considering the average points that were taken from PMSS subscales, it was determined that 68.3% (n = 205) of girls had changes in appetite, 65.7% (n = 197) had irritability, 47.7% (n = 143) had fatigue, 65.3% (n = 196) had swelling, 61.7% (n = 185) had pain, 51.3% (n = 154) had depressive feelings, 46.7% (n = 140) had changes in sleeping habits, 34.0% (n = 102) had depressive thoughts, and 18.7% (n = 156) had anxiety. The PMSS mean score was 112.27 ± 31.24.

Distribution of PMSS scores according to the girls' individual characteristics is summarized in Table 3. It is clear from the table that having illiterate mothers, low perceived income, divorced parents, living in a small town, cigarette smoking, and having anemia and malnutrition were associated with increased rate of PMS, but the difference between the groups was not found to be statistically significant (P > 0.05).

Distribution of PMSS scores according to menstrual and premenstrual characteristics and state of PMS in girls' mothers is summarized in Table 4. Having pain during the premenstrual period and menstrual period (P = 0.036), having menstrual problems after coming to Ordu (P = 0.000), and their mother having PMS (P = 0.045) were associated with having higher intensity in PMS and the differences were statistically significant. The girls who were informed about menstruation, whose menarche age was 13, whose menstrual cycle was over 35 days, whose menstruation duration was 4-6 days and who used 5-7 pads during menstruation were more likely to have PMS problems, but the difference was not statistically significant (P > 0.05).

Table 1. Distribution of girls according to intensity of PMS.

Intensity of premenstrual symptoms	n	%	PMSS score means ± SD
≤110 points	151	(50.3)	86.55 ± 16.64
≥111 points	149	(49.7)	138.34 ± 18.23
Total	300	(100.0)	112.27 ± 31.24

Table 2. Percentage and number of girls receiving over 50% from subscales and mean scores received from subscales and total PMSS (n = 300).

PMSS subscales	Subscales min-max points	Marked min-max points	X±SD	Percentage and number of girls receiving over 50% from subscales
Depressive feeling	7-35	7-35	18.13 ± 6.94	154 (51.3)
Anxiety	7-35	7-33	12.69 ± 5.80	56 (18.7)
Fatigue	6-30	5-25	14.25 ± 4.93	143 (47.7)
Irritability	5-25	5-25	14.84 ± 5.33	197 (65.7)
Depressive thoughts	7-35	7-31	14.80 ± 6.47	102 (34.0)
Pain	3-15	3-15	8.44 ± 3.07	185 (61.7)
Changes in appetite	3-15	3-15	9.42 ± 3.69	205 (68.3)
Changes in sleeping habits	3-15	3-15	7.35 ± 3.26	140 (46.7)
Swelling	3-15	3-15	9.21± 3.69	196 (65.3)
Total PMSS	44-220	48-184	112.27 ± 31.24	149 (49.7)

Table 3. PMSS scores according to girls' individual characteristics and significant test results.

Individual characteristics (n = 300)	PMSS scores				Test for significance and P value
	≤110 points		≥111 points		
	n	%	n	%	
Mother's education					
Illiterate	8	(33.3)	16	(66.7)	
Literate	16	(55.2)	13	(44.8)	
Primary school	94	(52.5)	85	(47.5)	$\chi^2 = 4.821$
High school	29	(51.8)	27	(48.2)	P = 0.306
University	4	(33.3)	4	(66.7)	
Perceived income					
Adequate	90	(53.3)	79	(46.7)	$\chi^2 = 1.920$
Partially adequate	55	(47.8)	60	(52.2)	P = 0.383
Inadequate	6	(37.5)	10	(62.5)	
Family type					
Nuclear family	135	(51.9)	125	(48.1)	$\chi^2 = 2.871$
Extended family	14	(43.8)	18	(56.2)	P = 0.238
Divorced family	2	(25.0)	6	(75.0)	
Permanent residence					
Country	76	(51.4)	72	(48.6)	$\chi^2 = 0.128$
City	59	(49.2)	61	(50.8)	P = 0.938
Village	16	(50.0)	16	(50.0)	
Cigarette smoker					
Yes	19	(38.8)	30	(61.2)	$\chi^2 = 3.130$
No	132	(52.6)	119	(47.4)	P = 0.077
Anemia					
Yes	38	(46.3)	44	(53.7)	$\chi^2 = .719$
No	113	(51.8)	105	(48.2)	P = 0.396
Adequate and balanced nutrition					
Yes	77	(55.0)	63	(45.0)	$\chi^2 = 2.287$
No	74	(46.3)	86	(53.8)	P = 0.130

Discussion

Previous studies have generally focused on women in their 20s and 30s. We thought that PMS is common at younger ages. Our study revealed that PMS is a major problem among girls, which is consistent with the findings in studies by Fisher et al. (14) and Derman et al. (15). They reported that PMS was common in their population of adolescents and that the prevalence and severity did not differ significantly from those in adults.

In this study, which was conducted to investigate the frequency of premenstrual symptoms and contributing factors, 49.7% (149 girls) received 111 points and higher from the PMSS. The PMSS subscales with the highest points were changes in appetite (68.3%), irritability, swelling, fatigue, pain and depressive feelings in that order.

Premenstrual symptoms are experienced by up to 5%-90% of women of reproductive age (11,16-20). A smaller subset meets the criteria for PMS and less

Table 4. PMSS scores according to menstrual and premenstrual characteristics, PMS of girls' mothers, and significant tests results.

| Variables (n = 300) | PMSS scores | | | | Test for significance and P value |
| | ≤110 points | | ≥111 points | | |
	n	%	n	%	
Information about menstruation					
Yes	124	(50.0)	124	(50.0)	$\chi^2 = 0.064$
No	27	(51.9)	25	(48.1)	P = 0.801
Age at menarche					
≤ 12	35	(52.2)	32	(47.8)	$\chi^2 = 0.125$
≥ 13	116	(49.8)	117	(50.2)	P = 0.723
Menstrual cycle length (days)					
≤20	10	(58.8)	7	(41.2)	
21-27	61	(49.2)	63	(50.8)	$\chi^2 = 0.630$
28-35	71	(50.7)	69	(49.3)	P = 0.890
≥35	9	(47.4)	10	(52.6)	
Menstruation duration (days)					
≤3	9	(75.0)	3	(25.0)	$\chi^2 = 3.487$
4-6	92	(47.9)	100	(52.1)	P = 0.175
≥7	50	(52.1)	46	(47.9)	
Pads used (number)					
≤7	23	(47.9)	25	(52.1)	
8-10	49	(50.5)	48	(49.5)	$\chi^2 = 0.150$
11-20	66	(51.2)	63	(48.8)	P = 0.985
≥20	13	(50.0)	13	(50.0)	
Premenstrual and menstrual pain					
Yes	123	(47.9)	134	(52.1)	$\chi^2 = 4.388$
No	28	(65.1)	15	(34.9)	P = 0.036
Menstrual problems present after coming to university					
Yes	49	(37.7)	81	(62.3)	$\chi^2 = 14.664$
No	102	(60.0)	68	(40.0)	P = 0.000
PMS in mother					
Yes	77	(44.5)	96	(55.5)	
No	23	(63.9)	13	(36.1)	$\chi^2 = 6.181$
I don't know	51	(56.0)	40	(44.0)	P = 0.045

than 10% are diagnosed as having premenstrual dysphoric disorder (PMDD) (12). In a study conducted with adolescents in the US, the frequency of PMS was found to be 14%, while in another study 96% were determined to have less intensive and 43% severe PMS (14,18-20). In studies conducted with university students in Turkey, the incidence of PMS in adolescents was found to be 21% by Güneş et al. (21), 61.4% by Derman et al. (15), and 17.2% by Karavuş et al. (22).

Mortola et al. found the following symptoms most prevalent in PMS: drowsiness, tiredness (92%), irritability (91%), mood changes (81%), depression (80%), low noise tolerance (65%), low self-esteem

(65%), anxiety (65%), decreased libido (65%), fear of the future (65%), and lack of concentration (47%) (4). The most prevalent somatic symptoms were: abdominal distension (90%), mastodynia (85%), acne, seborrhea (71%), excessive appetite and thirst (70%), headaches and vomiting (70%), cardiac arrhythmia (13%), vascular lesions (13%), and dizziness (13%) (7).

In a study on PMS in Chinese adolescents by Chau et al. (23), the most common premenstrual symptoms were reported as fatigue (45.8%) and abdominal bloating (42.5%). The most common psychological symptoms were irritability (41.2%), mood swings (37.9%), anxiety (31.4%), nervous tension (34.0%), and depression (30.1%).

In a study by Taşçı (24), which was carried out with nursing students in Turkey, premenstrual period symptoms were reported as back pain (47.5%), irritability (44.3%), breast tenderness/pain (39.3%), facial acne (41.0%), and excessive eating (32.8%). Sezgin et al. (25) evaluated the problems of university students before their menstrual cycle and determined that the most common complaints in increasing order were eating sweets, pain in the abdominal region, irritability and anger, back pain, and facial acne. In previous studies, PMS prevalence and symptom prevalence showed many differences. The source of those differences may be the utilized scales' not being standard. It can also be explained by the age differences, marital status, and race of the participating women. In our study, the determined PMS frequency and the symptom findings of current PMS are similar to those reported in the literature.

A study that was conducted with university students in Turkey showed that students whose financial level was good or poor had more PMS complaints and the difference was determined to be statistically significant (25). In our study, we determined that PMS mean score was higher for the students with low perceived income but the difference was not statistically significant.

PMS, in many women, is associated with dysmenorrheal; with the starting of the menstrual cycle, premenstrual symptoms are replaced with dysmenorrheal (26). In this study, we found that 52.1% of the girls who had dysmenorrhea also had

PMS. In addition, girls with pain in premenstrual and menstrual periods received higher PMSS scores than girls without pain and the difference was statistically significant. Demir et al. (27) found that PMS was significantly higher in women with dysmenorrhea than in women without dysmenorrhea (P < 0.05). Güneş et al. (21) found that the incidence of PMS in dysmenorrheal adolescents was 26.5%, while in non-dysmenorrheal adolescents it was 15.4%. This difference was determined to be statistically significant (P < 0.05). Sezgin et al. (25) reported similar findings. The results of this study are similar to the ones reported in the related literature.

Heredity is known to be associated with PMS and some studies show that genetic factors can play a role in PMS (28,29). Some studies suggest that women whose mothers were reported to have PMS had a higher ratio of PMS than those whose mothers did not have PMS (30,31). In addition, concordance rates for PMS are significantly higher in monozygotic twins (93%) compared with dizygotic twins (44%) (30).

Demir et al. (27) reported that PMS was higher in women whose mothers or sisters had similar complaints (24.6%). PMS was found in 5% of those whose mothers or sisters did not have PMS, and the difference was found to be statistically significant (P < 0.05). Güneş et al. (21) reported that students with PMS in mothers or sisters had a PMS incidence of 21.1%, while students without PMS in mothers or sisters had a PMS incidence of 18%. In our study, the incidence of PMS in girls with maternal PMS was 55.5%, compared to 36.1% for those whose sisters and mothers did not have PMS. The incidence of PMS was 44.0% in girls who did not know about their mothers' PMS. This difference was found to be statistically significant. The results of this study are consistent with the literature. Demir et al. (27) reported a significant relationship between smoking habit and PMS. PMS incidence was 13.9% for nonsmokers, 20.8% for 1-10 cigarettes/day smokers and 55.6% for over 21 cigarettes/day smokers. Sezgin et al. (25) found that smoking habit is an important variable in PMS and also reported that PMS was higher in smokers than in nonsmokers. In our study, the severity of PMS was higher in smokers than the nonsmokers, but the difference was not statistically significant, which is different from the literature.

PMS is a psycho-neuro-endocrine illness that has biological, psychological and social parameters. Symptoms can be specific, well-localized or repetitive and they can get worse with emotional stress (32). According to a study by Dilbaz (33), the PMS group was found to convert psychological problems into somatic complaints. It was determined that women with PMS experienced increased physical and psychological symptomatology during the late luteal phase. It is a known fact that leaving the parents and adapting to a new city cause emotional stress. This can cause some changes in the menstrual cycle. In our study, we found that PMS scores were over 111 for 63.3% of the girls who had PMS when they first came to Ordu , and for 40.0% of the girls who had no PMS during that transition period and the difference was found to be statistically significant. The results show that PMS incidence is higher in girls whose menstruation is affected by emotional stress. These results are parallel to the literature.

In conclusion, this study demonstrated that nearly half of the girls had PMS. PMS symptoms among the girls were changes in appetite, irritability, swelling, fatigue, pain, depressive feeling, changes in sleeping habits, depressive thinking, and anxiety in descending order of importance.

It was determined that pain in premenstrual and menstrual periods, maternal PMS, and having menstrual problems during the transition period to university life, in other words, emotional stress are contributing factors to PMS.

Gynecologists, primary care physicians, and public health personnel need to be aware of this problem. Further prospective studies in larger series concerning the etiology and further treatment modalities will be useful for the medical care of girls with PMS.

Acknowledgements

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