The Role of Mother in Informing Girls About Puberty: A Meta-Analysis Study

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Abstract

Context: Family, especially the mother, has the most important role in the education, transformation of information, and health behaviors of girls in order for them to have a healthy transition from the critical stage of puberty, but there are different views in this regard.
Objectives: Considering the various findings about the source of information about puberty, a meta-analysis study was conducted to investigate the extent of the mother's role in informing girls about puberty.
Data Sources: This meta-analysis study was based on English articles published from 2000 to February 2015 in the Scopus, PubMed, and Science direct databases and on Persian articles in the SID, Magiran, and Iran Medex databases with determined key words and their MeSH equivalent.
Study Selection: Quantitative cross-sectional articles were extracted by two independent researchers and finally 46 articles were selected based on inclusion criteria. STROBE list were used for evaluation of studies.
Data Extraction: The percent of mothers as the current and preferred source of gaining information about the process of puberty, menarche, and menstruation from the perspective of adolescent girls was extracted from the articles. The results of studies were analyzed using meta-analysis (random effects model) and the studies' heterogeneity was analyzed using the I^2 calculation index. Variance between studies was analyzed using tau squared (Tau^2) and review manager 5 software.
Results: The results showed that, from the perspective of teenage girls in Iran and other countries, in 56% of cases, the mother was the current source of information about the process of puberty, menarche, and menstruation. The preferred source of information about the process of puberty, menarche, and menstruation was the mother in all studies at 60% (Iran 57%, and other countries 66%).
Conclusions: According to the findings of this study, it is essential that health professionals and officials of the ministry of health train mothers about the time, trends, and factors affecting the start of puberty using a multi-dimensional approach that involves religious organizations, community groups, and peer groups.

Keywords: Menarche, Mother, Puberty

1. Context

Puberty is a critical juncture between childhood and adulthood and is a time of growing, changing, and gaining reproductive power (1, 2). Sudden and obvious changes in teenagers in all cultures despite the difference in its meaning are an effective and significant event in the lives of girls (1). Without adequate guidance, transition from this stage of life can create numerous challenges for adolescent girls, families, and communities (3). Many teenage girls express puberty as an unpleasant experience and consider menarche as most unpleasant incident in adolescence (4). Studies have shown that inadequate preparation for menarche creates a poor attitude toward menstruation and poor menstrual practices (5). Findings

also have shown that a teenage girl's readiness for puberty is inadequate and is focused on the negative aspects (2). Training on how to deal with the maturity process is a necessity for the safe passage of this critical period. The world health organization has emphasized the training needs of women and girls, especially in the field of hygiene and health, as a priority (6).

In Iran in recent years, reproductive health care has been one of the main concerns of the ministry of health and medical education and the ministry of education. However, due to cultural restrictions, sexual and reproductive health education is not provided clearly. Lack of adequate information about puberty and menstrual hygiene in

many girls in Iran leads to unhealthy and incorrect behaviors during the menstrual period (4, 7, 8). Family as the first social unit has the most important role in training and transformation of information and health behaviors for adolescents. Although each of the family members are involved in the education of puberty issues for adolescents, the position of the mother is more important than others, and more adolescents learn their health behaviors from their mothers (4, 9-11). Some studies also reported that parents are the main sources of information about reproductive health for their children. According to the findings of Nwagwu's study in Nigeria, the sources of information about reproductive health for adolescent girls are parents (56.1%), friends (53.18%), books (45.56%), teachers (44.15%), internet (45.19%), and health centers (54.14%) (12). Kumar et al. showed that mothers were the main source of information for 75% of girls, and sisters were the source of information for 8.64% of girls (13). Yet, many studies worldwide and in Iran show that most sources of information about reproductive health of adolescents are peers and the media (8, 10, 11, 14-16). The findings of Kamalikhah et al. revealed that the majority of students believed that the best training providers are health educators because of their convenient communication with the students. Some students said that mothers do not teach kids because they think it makes children impudent, others expressed embarrassment of discussing it with their mothers, and some students believed that their families should not be involved in their sexual education (8).

Considering the difference in the findings about the source of information of puberty, identifying the most effective source of information is important. Incorrect teaching of peers can cause irreparable health and social consequences in teenagers (12). According to findings of Bastien et al. sexual experiences in teenagers whose source of information was their peer groups were 55% and in teenagers whose source of information was their parents and other sources were 34% (17). Mothers as a source of information for teenage girls can answer numerous questions in reproductive issues so that the quality of the mother-daughter relationship can prevent lots of physical, psychological, and social problems and unhealthy behaviors that are rooted in adolescence (18). The main question is the percentage of mothers as a current and preferred source of information for girls concerning puberty, menarche, and menstruation.

2. Objectives

Given the importance of safe passage during puberty, this meta-analysis study has been done to evaluate the current and preferred role of the mother in informing the daughter about puberty.

3. Data Sources

The papers published in international databases in English (PubMed, Scopus, Science Direct) and locally (Iran Medex, Magiran, SID) from January 2000 to February 2015 were extracted by two independent researchers. The search of international databases used a search strategy of articles with keywords including (female adolescent reproductive health) OR (menstruation) OR (menarche) AND (mother) and their equivalent in MeSH and was combined with search operators (AND, OR) to extract articles. Since some Iranian databases showed no sensitivity to search operators (AND, OR), the search in the Iranian database was done by main, sensitive, and public keywords such as menarche, menstruation, and their MeSH equivalent to provide a high sensitivity.

4. Study Selection

Through reading the titles and abstracts of articles, some studies were determined to be irrelevant to the question of the research and were excluded. For those that were completely or possibly related, the full text of the articles and their references were investigated as possible resources in the study. Articles with a completely related purpose with our goal were selected, and then the articles that had inclusion criteria were investigated. Inclusion criteria included access to the full text of quantitative cross-sectional articles in English or Farsi and the study population of adolescent girls 10 - 19 years old. For consistency in the analysis, qualitative, case-control, cohort, and intervention studies were excluded from the study. Moreover, for access to certain additional information (exact sample size), the researchers communicated with the authors of those papers. Figure 1 shows a summary of the selection process.
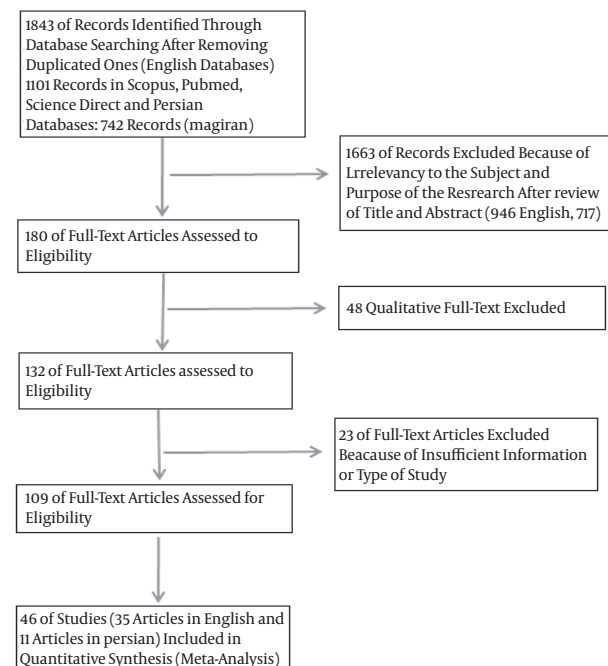
Figure 1. Flow Diagram Showing the Articles Selection Process for Review of Meta-Analysis

5. Data Extraction

Seven items of a STROBE (Strengthening the Reporting of Observational studies in Epidemiology) list were used for evaluation studies including a detailed explanation of the purpose, an accurate description of place and time of the study, inclusion criteria and selection procedures, the adequacy of sample size, ethical consideration, statistical analysis, and control of lost samples (Figures 2 and 3)(19). Also, the percent of mothers as the current source of information about the process of puberty, menarche and menstruation (CSIPMM), mother as the preferred source of information about the process of puberty, menarche and menstruation (PSIPMM) and sample size for calculating the standard error (SE) extracted from the articles. It should be noted that all stages of the evaluation of articles was done by two independent researchers. In case of disagreement between the investigators, an article was judge by a third. Moreover, for access to certain additional information, we communicated with the authors of those papers. Table 1 shows the extracted data in summary and the characteristics of the studies, and Figures 2 and 3 show the evaluation of the quality of studies.

5.1. The Combination of Data and Statistical Analysis

Review Manager 5 software was used to analyze the data. Statistical heterogeneity was determined using the Q test. Lack of consistency between studies was evaluated using I^2 index (62). Variance between studies was investigated using tau squared (Tau^2) (63). Due to the high heterogeneity between studies, Iranian and non-Iranian studies were compared separately in two subgroups. Meta-analysis was done to take summary of "mother as a current source of information for girls about puberty, menarche, and menstruation" and "mother as the preferred source of information about puberty, menarche, and menstruation for girls." Data was analyzed and results were analyzed using a random-effect model and 95% confidence interval (64).

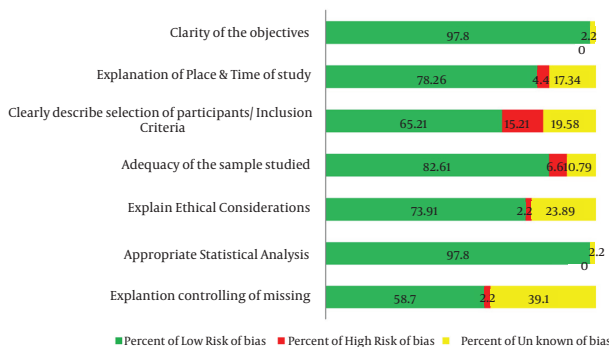**Figure 2.** Risk-of-Bias Graph About Included Studies

Figure 3. Risk-of-Bias Summary Indicating the Review Authors' Judgment About Each Risk-of-Bias Item for Each Included Study. Green color: low risk bias; red color: high risk bias; without color: unknown bias.

Table 1. General Data of the Selected Studies in Meta-Analysis

Author (Publish Year)	Sample Size, Girls	Country	Age Range (Mean ± SD)	Major Findings
Abdolahi et al. (2004) (20)	1746	Iran (Mazandaran)	12 - 15 (13.33 ± 1.03)	Mothers were the first source of information in 62% of girls.
Alavi et al. (2009) (21)	386	Iran (Tehran)	14 (14)	Mothers were the most important source of knowledge (73.4%) about menarche and changes in puberty process.
Amuand Bamidele (2014) (22)	400	South Western Nigeria (Osogbo)	10 - 19	Source of information about menstruation prior to menarche was mother (81.1%), teacher (7.4%), peer groups (6.1%), health provider (3.6%), and media (1%).
Aniebue et al. (2009) (23)	495	Nigeria (Enugu)	12 - 15 (14.9 ± 1.7)	Pre-menarcheal training was received by 55.2% of students, and the rest had no preparation prior to menarche. Mothers (71.5%), followed by other relatives (16%), were the main source of menstrual information in the study.
Baiali Meibodi et al. (2010) (24)	450	Iran (Kerman)	11 - 15 (12.36 ± 1.49)	Mothers were the most important source of knowledge (47.6%) about menarche and changes in puberty before menarche; 81.6% of participants shared their menarche with mother.
Bobhate, and Shrivastava (2012) (25)	241	India (Mumbai)	10 - 19	Only 20.3% of the participants were aware about menstruation before menarche, the main source of information being mother in 55.1% subjects, relative in 26.5%, and friend in 18.3%.
Dambhare et al. (2012) (26)	561	India (Maharashtra)	10 - 19 (15.4 ± 1.7)	From study subjects informed about menstruation, 38.15% of participants got information about menarche from mother, followed by friend (32.26%), teacher (3.03%), and books or magazines (2.14%).
Dasgupta and (2008) (27)	160	India (Hooghly district)	14 - 17	Source of information about menstruation prior to menarche in respondents was mother (37.5%), relative (1.25%), and friend (28.75%).
Deo and Ghat-targi (28)	168	India (Ambajogi)	12 - 17	An urban girl's mother was the main source of information about menstruation (27.5%), while it was teacher in the rural counterparts (27.01%). Other sources of information were friends, relatives, and books.
Dhingra et al. (2009) (29)	200	India (Gujjar)	13 - 15	A large sample (64%) of the girls was only partially aware about menstruation before they experienced it. The respondents were asked to reveal the major sources of information about menstruation, and it was found that 83% of the respondents had received information from friends, while the source of information for others was television (3%), mothers (5%), magazines (5%), movies (10%), and relatives (6.5%).
El-Gilany et al. (2005) (30)	664	Egypt (Mansoura)	14 - 18	Mass media (92.2%), peers and friends (12.1%), mothers (92.2%), older sister (45%), and school curricula (18.1%) were the most common sources of information about menstrual hygiene.
Ersoy et al. (2004) (31)	1017	Turkey (Manisa)	14 - 18 (15.7 ± 1.1)	Mothers were found to be the most important source of knowledge about menarche (57%). In high, middle, and low socioeconomic status, the percentage was 65.3%, 58%, and 50.5%, respectively.
Jarrah and Ka-mel (2012) (5)	490	Jordan	12 - 18 (15.2 ± 1.6)	82.46% of subjects reported they were not prepared adequately before menstruation. Source of information about menstruation prior to menarche was ranked by girls: mother (57.1%), teacher (15.7%), sister (14.5%), friends (8.6%), book and journal (1.9%), media (1.6%), and health team (0.5%).
Jogdand and Yerpude (2011) (32)	257	India (Guntur)	10 - 19	Only 36.19% of girls were aware regarding menstruation prior to the attainment of menarche. In 61.29% of girls, their mother was found to be first source of information regarding menstruation. Teachers (13.98%), friends (22.5%), and relatives (2.15%) were other sources of information.
Juyal et al. (2012) (33)	453	India (Uttarkhand)	15 - 18	In total, 64.5% of the participants (urban and rural) had awareness about menstruation prior to menarche. Source of information about menarche was mother (31.2%), sister (28.1%), friend (31.8%), relative (2.1%), neighbor (1.7%), teacher (3.4%), and others (1.7%).
Kamaljit et al. (2012) (34)	300	India (Punjab)	(16)	Among 300 respondents, mother was the first informant in 55.3% of the respondents. Other sources of information were sisters, friends, teachers and relatives, 12.7%, 6.3%, 11.7%, and 16.0%, respectively.
Kamath et al. (2013) (35)	550	India (Manipal)	13 - 16	The present study showed that only 51% of the participants (urban and rural) had awareness about menstruation prior to menarche. Mothers, followed by friends and sisters, were the more common sources of information in both rural and urban participants.
Kolivand et al. (2013) (36)	535	Iran (Kermanshah)	14 - 18 (15.9)	The source of information about menstruation was mother (47.9%), friend (12.5%), teacher (7.3%), book (16.6%), media (3.6%), and other (12.1%).
Kumar and Babu (2012) (13)	81	India (Andhra Pradesh)	15 - 19 (17.5 ± 1.1)	About 6% of subjects did not have any information about menses before menarche. Mothers were the most common source of information about menstruation prior to menarche.
Goel, GM (2011) (37)	478	India (Rohtak City)	15 - 19	More than half of the girls discussed their menstruation-related problems with their mothers and one third preferred to discuss with friends.
Lee et al. (2006) (38)	2411	Malaysia (Negeri Sembilan)	12 - 19 (15.4 ± 1.8)	Mothers were the most important persons the girls turned to for answers regarding menstruation (80.0%), followed by friends (39.7%), sisters (30.4%), the mass media (30.0%), teachers (25.2%), and health providers (14.4%).

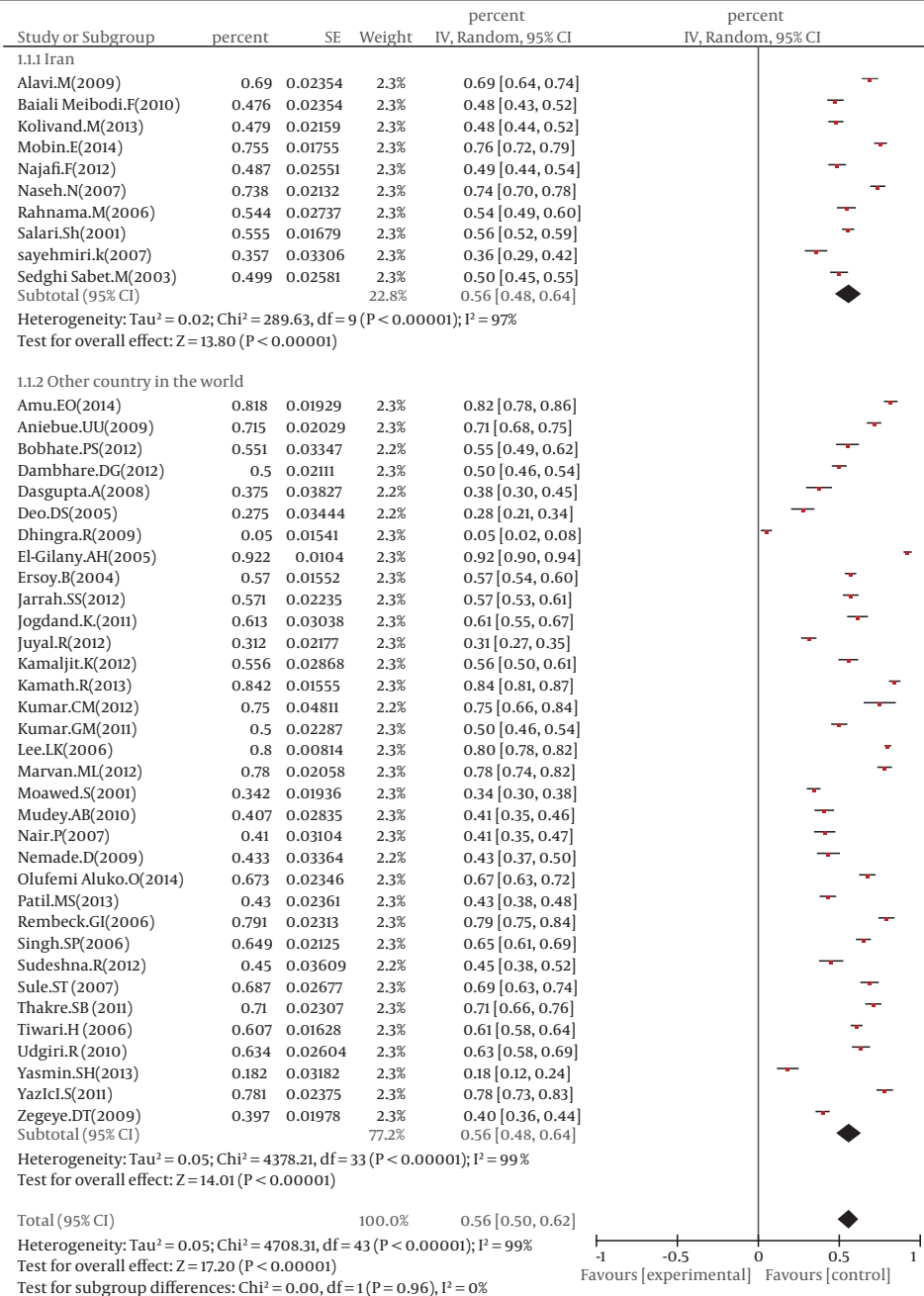|				
Marvan et al. (2012) (39)	405	Mexico (Mexico City)	12 - 15	Overall, 94% of participants claimed to have discussed menstruation with their mothers prior to their first period. The main sources were mothers (78%), and that the other sources mentioned were sisters (10%), teachers (6%), friends (4%), and others (2%).
Moawed (2001) (40)	600	Saudi Arabia (Riyadh)	11 - 18 (14 ± 1)	Source of information about menstruation prior to menarche was none (43.7%), mother (34.2%), school (3.7%), friends (2%) and religious books (16.5%).
Mobin and Karimi (2014) (41)	600	Iran (yazd)	15	Mothers and sisters were the most common (75.5%) and preferred (53.7%) source of information about menstruation.
Mudey et al. (2010) (42)	300	India (Wardha)	10 - 19 (14.25)	Majority of girls received information regarding menstruation from their mothers (40.67%), followed by television and movies (23.67%), and friends (19.00%). Only 10.33% girls received information from their teacher.
Najafi et al. (2012) (43)	384	Iran (lahijan)	14 (14)	There was a meaningful relationship between source of awareness and attitude toward puberty sanitation. Mothers were the most common (48.7%) and preferred (51.3%) source of information about menstruation.
Naseh et al. (2007) (44)	325	Iran (Birjand)	12 - 18	Girls mostly discuss their puberty problem with their mothers and sister (73.8%), friends (5.7%), other (7.6%), and no one (12.6%).
Nemade et al. (2009) (45)	217	India (Mumbai)	15 - 16	All the girls were aware of menstruation. 43.3% girls reported that their mother was the main source of information about menstruation. Other sources of information were friends (26.3%), sisters (14.7%), relatives (8.3%), literature e.g. magazines, newspapers (6.5%), and television (0.9%).
Aluko et al. (2014) (46)	400	Southwestern Nigeria	10 - 19 (15.3 ±1.5)	The respondents obtained information and guidance on menstrual absorption preferences from mothers (67.3%), sisters (18.3%), peers (5.8%), and mass media (5.6%).
Nair et al. (2007) (47)	251	India (Delhi)	10 - 19	Mothers (41%) were the most common source of information about menstruation, followed by elder sisters (22.4%), friends (21%), relatives (6.7%), television (4.4%), books (3.3%), and doctors (1.1%)
Patil and Murteli (2013) (48)	440	India (Bijapur)	11 - 15	The main source of information about menstruation was mother (43%), friends (24.7%), sister (15.3%), relative (10.7%), and neighbor (6.3%).
Poureslami and Ashtiani Ousati (2002) (7)	250	Iran (Karaj)	15 - 18	Generally, 61% of the study subjects preferred to discuss their menstrual related problems with their mother, 5% with a teacher, and 8% with health workers.
Rahnama et al. (2006) (49)	331	Iran (Zabol)	15 - 18 (15.8 ± 1)	Most girls (54.4%) have been received their information from their mothers.
Rembeck et al. (2006) (50)	309	Southwestern Sweden	12 (12)	The source of information about menstruation was mother (79.1%), father (4.9%), sibling (16.1%), friend (43.5%), teacher (40.9%), television (16%), school nurse (67.1%), magazines (29.6%), and other person (6.2%).
Salarilak et al. (2001) (51)	876	Iran (Urmia)	14 - 18	The majority of girls received their information from mothers (55.5%) and sisters (13.3%) for the first time. 64.1% of girls emphasized that there is a need for education, and 47.1% mentioned that the best people for training were their parent.
Sayemiri and Morvarid (2007) (52)	210	Iran (Ilam)	17 (17)	In total, 35.7% of students identified their mothers as the first source of information.
Sedghi-Sabet et al. (2003) (53)	375	Iran (Somesara)	15 - 18	The results of this research showed that 65.3% of subjects had moderate knowledge, 16.3% had positive attitude and 54.1% had poor health behavior. 49.9% of students identified their mothers was the first source of information about menarche.
Singh et al. (2006) (54)	504	India (Varanasi)	10 - 19 (14.8 ±1.7)	Source of information about menstruation was mother (65%), friends (27.5%), book and magazines (2.2%), relatives (2.2%), teachers and other (2.2%).
Sudeshna and Aparajita (2012) (55)	190	India (West Bengal)	13 - 19	In general, 42% of the girls had knowledge about menstruation before their onset of menarche, the main source of knowledge was mother and sister (45%).
Suleand Ukwe-nya (2007) (16)	358	Nigeria (Zaria)	12 - 18 (15.6 ±1.3)	Menstrual issues were discussed with mothers (68.70%), female friends (54.20%), sisters (26.72%), female cousins (8.40%), aunts (6.87%), fathers (4.58%), brothers (1.53%), male friends (1.53%), male cousins (0.76%), uncles (0.76%), and grandmothers (0.76%). Some girls had discussed it with more than one person.
Thakre et al. (2011) (56)	387	India (Nagpur District)	12 - 17 (13.8 ± 0.8)	36.95% of subjects reported they got information about menarche. Source of information about menarche was mother (71.33%), sister (23.78%), friends (18.18%), teacher (11.89%), and other (12.59%).
Tiwari et al. (2006) (57)	900	India (Anand district, Gujarat)	11 - 17	Source of information about menarche was mother (60.7%), older sister (16.8%), friends (13.6%), teacher (6%), and other (3.9%).
Udgiri et al. (2010) (58)	342	India (Bijapur)	18 - 19	The present study observed that only 63 (18.42%) had knowledge about menstruation before menarche. Majority of adolescent girls gained information from mother (63.49%) and sister (23.80%). Other sources of information were friends, neighbors, and relatives.
Yasmin et al. (2013) (59)	147	India (West Bengal)	13 - 18 (15.5 ±1.2)	Source of knowledge of menstrual cycle before menarche was mother (18.3%), relative (3.4%), friend (20.4%), and did not know (57.9%).
YazIcI et al. (2011) (60)	297	Turkey (Bakırko y and Zeytinburnu)	11 - 15 (13.2 ± 0.9)	Girls mostly discuss their puberty symptoms with their mothers (82.8%). Sources of information on puberty were mother (78.1%), father (1%), sibling (2.4%), friend (6.4%), teacher (4.7%), and newspaper/TV/magazine (7.4%).
Zegeye et al. (2009) (61)	612	Northwestern Ethiopia	14 - 19 (17.4 ± 1)	Source of information about menarche was mother (39.7%), friends/school (26.6%), and teacher (21.8%).

6. Results

Of 1843 retrieved studies, using search strategy, 180 studies were considered potentially eligible. After screening full texts, 46 studies were eventually included for meta-analysis, including 35 studies published in English and 11 studies in Persian (Table 1). Data from 18295 participants was analyzed separately in two subgroups, Iranian and non-Iranian studies. Forty-six quantitative studies were included in synthesis: India 21, Iran 12, Nigeria 4, Turkey 2, Egypt 1, Jordan 1, Malaysia 1, Mexico 1, Saudi 1, Sweden 1, Ethiopia 1. In the present study, data was from a total of 18295 persons. The results from the perspective of teenage girls showed:

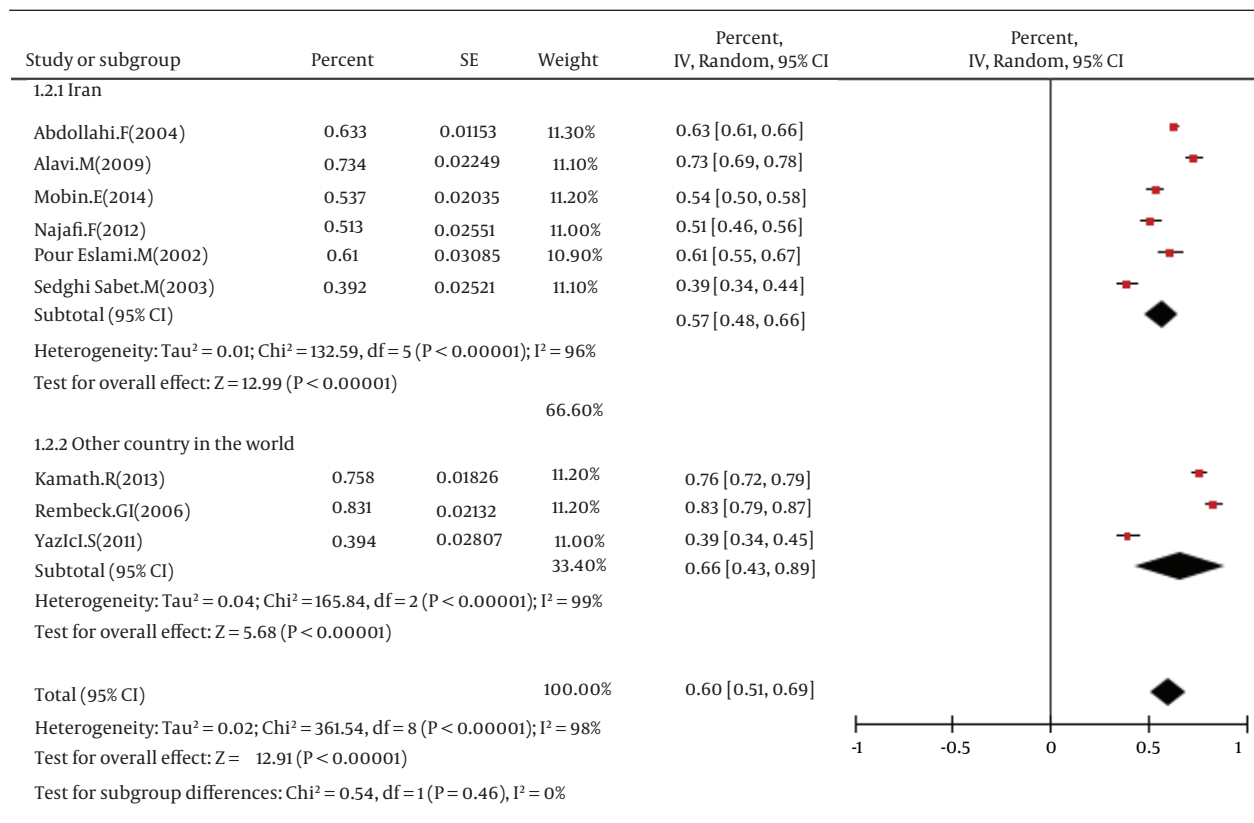In 56% of cases, the mother was the CSIPMM in Iranian and non-Iranian studies (Figure 4).

The mother was the PSIPMM was 57% in Iranian studies, 66% in non-Iranian studies, and 60 % in all studies (Figure 5).

Figure 4. Amount of the Role of the Mother As a CSIPMM in Terms of Girls

Study or Subgroup	percent	SE	Weight	IV, Random, 95% CI
1.1.1 Iran				
Alavi.M(2009)	0.69	0.02354	2.3%	0.69 [0.64, 0.74]
Baiali Meibodi.F(2010)	0.476	0.02354	2.3%	0.48 [0.43, 0.52]
Kolivand.M(2013)	0.479	0.02159	2.3%	0.48 [0.44, 0.52]
Mobin.E(2014)	0.755	0.01755	2.3%	0.76 [0.72, 0.79]
Najafi.F(2012)	0.487	0.02551	2.3%	0.49 [0.44, 0.54]
Naseh.N(2007)	0.738	0.02132	2.3%	0.74 [0.70, 0.78]
Rahnama.M(2006)	0.544	0.02737	2.3%	0.54 [0.49, 0.60]
Salari.Sh(2001)	0.555	0.01679	2.3%	0.56 [0.52, 0.59]
sayehmiri.k(2007)	0.357	0.03306	2.3%	0.36 [0.29, 0.42]
Sedghi Sabet.M(2003)	0.499	0.02581	2.3%	0.50 [0.45, 0.55]
Subtotal (95% CI)			22.8%	0.56 [0.48, 0.64]

Heterogeneity: Tau² = 0.02; Chi² = 289.63, df = 9 (P < 0.00001); I² = 97%
Test for overall effect: Z = 13.80 (P < 0.00001)

Study or Subgroup	percent	SE	Weight	IV, Random, 95% CI
1.1.2 Other country in the world				
Amu.EO(2014)	0.818	0.01929	2.3%	0.82 [0.78, 0.86]
Aniebue.UU(2009)	0.715	0.02029	2.3%	0.71 [0.68, 0.75]
Bobhate.PS(2012)	0.551	0.03347	2.2%	0.55 [0.49, 0.62]
Dambhare.DG(2012)	0.5	0.02111	2.3%	0.50 [0.46, 0.54]
Dasgupta.A(2008)	0.375	0.03827	2.2%	0.38 [0.30, 0.45]
Deo.DS(2005)	0.275	0.03444	2.2%	0.28 [0.21, 0.34]
Dhingra.R(2009)	0.05	0.01541	2.3%	0.05 [0.02, 0.08]
El-Gilany.AH(2005)	0.922	0.0104	2.3%	0.92 [0.90, 0.94]
Ersoy.B(2004)	0.57	0.01552	2.3%	0.57 [0.54, 0.60]
Jarrah.SS(2012)	0.571	0.02235	2.3%	0.57 [0.53, 0.61]
Jogdand.K.(2011)	0.613	0.03038	2.3%	0.61 [0.55, 0.67]
Juyal.R(2012)	0.312	0.02177	2.3%	0.31 [0.27, 0.35]
Kamaljit.K(2012)	0.556	0.02868	2.3%	0.56 [0.50, 0.61]
Kamath.R(2013)	0.842	0.01555	2.3%	0.84 [0.81, 0.87]
Kumar.CM(2012)	0.75	0.04811	2.2%	0.75 [0.66, 0.84]
Kumar.GM(2011)	0.5	0.02287	2.3%	0.50 [0.46, 0.54]
Lee.LK(2006)	0.8	0.00814	2.3%	0.80 [0.78, 0.82]
Marvan.ML(2012)	0.78	0.02058	2.3%	0.78 [0.74, 0.82]
Moawed.S(2001)	0.342	0.01936	2.3%	0.34 [0.30, 0.38]
Mudey.AB(2010)	0.407	0.02835	2.3%	0.41 [0.35, 0.46]
Nair.P(2007)	0.41	0.03104	2.3%	0.41 [0.35, 0.47]
Nemade.D(2009)	0.433	0.03364	2.2%	0.43 [0.37, 0.50]
Olufemi Aluko.O(2014)	0.673	0.02346	2.3%	0.67 [0.63, 0.72]
Patil.MS(2013)	0.43	0.02361	2.3%	0.43 [0.38, 0.48]
Rembeck.GI(2006)	0.791	0.02313	2.3%	0.79 [0.75, 0.84]
Singh.SP(2006)	0.649	0.02125	2.3%	0.65 [0.61, 0.69]
Sudeshna.R(2012)	0.45	0.03609	2.2%	0.45 [0.38, 0.52]
Sule.ST (2007)	0.687	0.02677	2.3%	0.69 [0.63, 0.74]
Thakre.SB (2011)	0.71	0.02307	2.3%	0.71 [0.66, 0.76]
Tiwari.H (2006)	0.607	0.01628	2.3%	0.61 [0.58, 0.64]
Udgiri.R (2010)	0.634	0.02604	2.3%	0.63 [0.58, 0.69]
Yasmin.SH(2013)	0.182	0.03182	2.3%	0.18 [0.12, 0.24]
YazIcI.S(2011)	0.781	0.02375	2.3%	0.78 [0.73, 0.83]
Zegeye.DT(2009)	0.397	0.01978	2.3%	0.40 [0.36, 0.44]
Subtotal (95% CI)			77.2%	0.56 [0.48, 0.64]

Heterogeneity: Tau² = 0.05; Chi² = 4378.21, df = 33 (P < 0.00001); I² = 99%
Test for overall effect: Z = 14.01 (P < 0.00001)

Total (95% CI)			100.0%	0.56 [0.50, 0.62]

Heterogeneity: Tau² = 0.05; Chi² = 4708.31, df = 43 (P < 0.00001); I² = 99%
Test for overall effect: Z = 17.20 (P < 0.00001)
Test for subgroup differences: Chi² = 0.00, df = 1 (P = 0.96), I² = 0%

Each line segment shows a length of 95% confidence interval. The rhombic sign is the result of combining all studies with a 95% confidence interval. The results showed that, from the perspective of teenage girls in Iran and other countries, in 56% of cases, the mother was a CSIPMM. Abbreviations: SE, standard error; IV, inverse variance. ; CSIPMM, current source of information about the process of puberty, menarche and menstruation.

Figure 5. Amount of the Role of the Mother As a PSIPMM in Terms of Girls

Study or subgroup	Percent	SE	Weight	Percent, IV, Random, 95% CI	Percent, IV, Random, 95% CI
1.2.1 Iran					
Abdollahi.F(2004)	0.633	0.01153	11.30%	0.63 [0.61, 0.66]	
Alavi.M(2009)	0.734	0.02249	11.10%	0.73 [0.69, 0.78]	
Mobin.E(2014)	0.537	0.02035	11.20%	0.54 [0.50, 0.58]	
Najafi.F(2012)	0.513	0.02551	11.00%	0.51 [0.46, 0.56]	
Pour Eslami.M(2002)	0.61	0.03085	10.90%	0.61 [0.55, 0.67]	
Sedghi Sabet.M(2003)	0.392	0.02521	11.10%	0.39 [0.34, 0.44]	
Subtotal (95% CI)				0.57 [0.48, 0.66]	
Heterogeneity: Tau² = 0.01; Chi² = 132.59, df = 5 (P < 0.00001); I² = 96%					
Test for overall effect: Z = 12.99 (P < 0.00001)					
			66.60%		
1.2.2 Other country in the world					
Kamath.R(2013)	0.758	0.01826	11.20%	0.76 [0.72, 0.79]	
Rembeck.GI(2006)	0.831	0.02132	11.20%	0.83 [0.79, 0.87]	
YazIcI.S(2011)	0.394	0.02807	11.00%	0.39 [0.34, 0.45]	
Subtotal (95% CI)			33.40%	0.66 [0.43, 0.89]	
Heterogeneity: Tau² = 0.04; Chi² = 165.84, df = 2 (P < 0.00001); I² = 99%					
Test for overall effect: Z = 5.68 (P < 0.00001)					
Total (95% CI)			100.00%	0.60 [0.51, 0.69]	
Heterogeneity: Tau² = 0.02; Chi² = 361.54, df = 8 (P < 0.00001); I² = 98%					
Test for overall effect: Z = 12.91 (P < 0.00001)					
Test for subgroup differences: Chi² = 0.54, df = 1 (P = 0.46), I² = 0%					

Each line segment shows a length of 95% confidence interval. The rhombic sign is the result of combining all studies with a 95% confidence interval. The diagram shows, from the perspective of teenage girls, the PSIPMM as mother was 57% in Iran, 66% in other countries, and 60% in total. Abbreviations: SE, standard error; IV, inverse variance; PSIPMM, preferred source of information about the process of puberty, menarche and menstruation.

This study investigated the amount of the role of mothers in girls' information about process of puberty and menarche in meta-analysis from 46 quantitative studies (mother was 56% of current and 57 - 66% of preferred source of information in teenage girls ages 10 - 19 years about puberty, menarche, and menstruation). Studies conducted were from 2000 to February 2015. After confirmation of the research in terms of heterogeneity according to the random-effect model, the occurrence of mother as the current and preferred source of gaining information about the process of puberty, menarche, and menstruation was calculated. After preliminary calculations, the heterogeneity index was calculated for mother as the current source at 99% and for mother as preferred source at 98%, and due to the high heterogeneity of results, the random-effect model was used in all stages. In this model, it is assumed that the observed differences result from a different sampling and different parameters than measured in different studies.

The results in forest plot 1 show, from the perspective of teenage girls in Iran and other countries, in 56% of cases (48 - 64% CI: 95%) and in total in 56% of girls (50 - 62% CI: 95%), mother was the CSIPMM. The minimum and maximum amount of the current role of mother in informing puberty, menarche, and menstruation belong to India

and Egypt by 5% and 92% respectively. Although the high amount of the role of mother as CSIPMM has been seen in several studies (13, 35, 38, 50) and was confirmed in the current analysis, various studies have reported high occurrences of the role of the media and individuals with low knowledge like friends in informing about puberty and some mysterious issues such as menstruation, sexuality, and reproductive health (8, 10, 11, 14, 15, 29, 30). In Onyeonoro's study, primary sources of sexual information mainly were the media (69%) and peers (76.3%), while the family and the school were not involved in the provision of sex education and had small contribution (11). In many cases, media and peers often have negative effects, and incorrect peer education can cause irreversible health and social consequences on the students (30). The norm of peers in cases of having a sexual relationship is a factor in early sexual intercourse in teenagers (14, 16, 65). Promotion of sex education by parents and religious leaders and their attention to their children's attitudes about sex was correlated with delayed sex (65). However, it seems that mothers are the best people to convey basic information about reproductive health to their daughters, but embarrassment, inadequate knowledge, some myths, and misconceptions of mothers in fields of reproductive health can prevent mothers from arming their teens with

required knowledge (66). Mothers need proper and adequate knowledge about physical and emotional changes of teenagers to recognize any deviations from reproductive health and also to overcome the shyness that might be related to sexual and reproductive health (67).

Based on the results shown in forest plot 2, from the perspective of teenage girls, mother as the PSIPMM in Iran was 57% (48 - 66% = CI 95%), in other countries was 66% (43 - 89% = CI 95%), and in total 60% (51 - 69% = CI 95%). The lowest level of mother as PSIPMM was 39% in Iran and Turkey and the highest rate was 83% in Sweden, but since the sample size was not identical, the comparison cannot be argued exactly. It seems that one important reason for this difference is caused by differences in race, ethnicity, or very different lifestyle in these countries. In Shah Hosseini's study, health care providers emphasized the role of mother as the most reliable source of information for adolescents (68). From the perspective of mothers, informing about menstruation is their duty, but they stated that its beginning is difficult because the explanation and understanding of menstruation is somewhat confusing (69). In Kamalikhah's study, parents were considered obstacles to sexual reproductive health discussions (8). Speaking about sexual health issues with adolescents was accompanied with embarrassment for some mothers (70). As a result, the relationship between parents and adolescents should be promoted through collaborative training programs. Some studies have emphasized the effects of formal education about health issues on female students (71). The America college of obstetricians and gynecologists (ACOG) believed that health education about menstruation period for youth and their parents is the duty of doctors and health professional (72). moreover, doctors should teach directly about the natural symptoms of menstruation and hygiene of this period to teenagers and their parents in parallel with assessing the physical growth and development during puberty (73).

7. Conclusions

In conclusion, even if mothers have enough knowledge, they may not be ready to share their information with their children. Some major factors include social ban, social taboos, embarrassment, and negative attitudes of mothers about discussing menstruation. Also, the improper mother-teenager relationship can block and limit a teenage girl's access to the most important sources of information, pave the way for incorrect and incomplete sources of inadequate information, and consequently cause health and wellness problems. Therefore, it is essential that health professionals and officials of the ministry of health use a multi-dimensional approach with a focus on training mothers, with help from religious organizations, community groups, and peer groups, as the main source of information and knowledge for girls (based on the findings of this study) on the time, process, and factors affecting the beginning of puberty and to make proper and timely decisions for informing their teenagers. Training programs of mothers should also include strengthening the relationship between mother and daughter and eliminating such inhibitions in discussing puberty or apathy about health consequences caused by lack of information.

The purpose of meta-analysis studies is as regulatory and systematic reviews of documents, quantitative summaries of results of each study, combining the results of different studies, and providing an overall interpretation of the results. With this in mind, the present study benefitted from the general conclusion derived from studies around the world. Determining the quality of each of the studies was a strength of the present study. The researchers did not have access to all the full studies, and that was a limitation for this review.

Teenagers have several unanswered questions about reproductive health and sexual issues. Any planning for reproductive health education should be based on the needs assessment and content analysis of health messages and should involve mothers in education. Every country has specific culture, education, and economical statuses, even urban and rural areas of a same country might be different, so researchers and health decision makers should consider these differences in their policies and researches.

Acknowledgments

Footnotes

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