

## Chronological Age Limit of Female Figures Portrayed In Sigiriya Fresco Pockets

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**Abstract:** Ancient paintings situated in a crevice in the rock-face of Sigiriya, the renowned world heritage site, which is an ancient rock fortress located in the Matale district Sri Lanka have captured marked interest of ancient people as well as the modern scholars. Only 19 complete female figures and 4 remnants of 3 female figures were preserved to the modern days. The sigiriya paintings have been interpreted in various contexts and the discussion on the subject of sigiriya paintings is one of several. In this paper selected female figures in frescoes pockets were studied in order to determine the age limits of selected female figures ultimately to contribute to the literature on these paintings with a different point of view. Tanner staging of the breast development was used in context to the age of menarche and its relation to tanner stage breast development to propose more scientific proposition on the lower limit of the female figures. In most girls menarche occurs in tanner stage IV breast development. Age of 14 year was considered the median age of menarche during king Kashyapa's time (477-495 AD) which was the logical lower limit of chronological age. Menopausal effect is one of the major causes of breast ptosis. Age of 40 years was considered the age of menopause during the time period king Kashyapa ruled this country. Paintings of female figures were selected from fresco pocket B. In current study fresco B3, B5, B7, B9, B10, B12, B13 were assed to determine the age limit. Paintings in which the upper body was covered with jacket and figures that could not adequately be examined for the breast anatomy were excluded in this study to maintain the consistency of results. In this research, in selected female figures-fresco B3, B5, B7, B9, B10, B12, B13, the lower limit of the chronological age was 14 years, the upper limit of the chronological age was 40 years. This finding is in accordance with several scholarly interpretations on the subject of paintings and also it provides scientific fortification to existing opinions and interpretations on the subject of paintings.

**Keywords:** Sigiriya paintings, Chronological age limit, Tanner staging, Regnault classification

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## Introduction

The breast is composed of skin, subcutaneous tissue, and breast tissue (Pandya and Moore, 2011) which houses the mammary gland that produces milk and delivers through development of branched tree-like network of ducts and lies on the anterior thoracic wall with the base extending from the second to the sixth rib (Drew, Cawthorne and Michell, 2007). The nipple is located over the fourth intercostal space in a non-pendulous breast. The nipple is surrounded by a circular pigmented areola. Nipple-areola complex changes especially during puberty (Copeland and Bland, 2009). At puberty, under the influence of ovarian hormone production [estrogen and progesterone], the breast enlarges due to the development of the mammary glands and increased deposition of fatty tissue (Pandya and Moore, 2011). Puberty is a stage of human development characterized by increasing levels of sex hormones [gonadal hormones], the appearance of secondary sexual characteristics, and the achievement of reproductive capability. The physical changes occurring in puberty are: Breast development (thelarche), Pubic and axillary hair growth (adrenarche), Growth spurt, Onset of menstruation (menarche).

The onset of secondary breast development [thelarche], is the first external sign of puberty for most girls (Sun *et al.*, 2002). The stages of breast development in girls that were described by Tanner in 1969 continue to be the standard for classifying pubertal changes.

- Stage 1: No glandular breast tissue palpable - the pre-pubertal breast.
- Stage 2: Breast bud palpable under the areola (1st pubertal sign in females). a small mound of breast tissue lies beneath a slightly enlarged areola.
- Stage 3: Breast tissue palpable outside areola; no areolar development. breast enlargement becomes more generalized. There continues to be a smooth contour between the areola and the rest of the breast
- Stage 4: Areola elevated above the contour of the breast, forming a “double scoop” appearance. separate areolar projection above the level of surrounding breast
- Stage 5: Areolar mound recedes into single breast contour with areolar hyperpigmentation, papillae development, and nipple protrusion. adult breast with resolution of areolar mounding

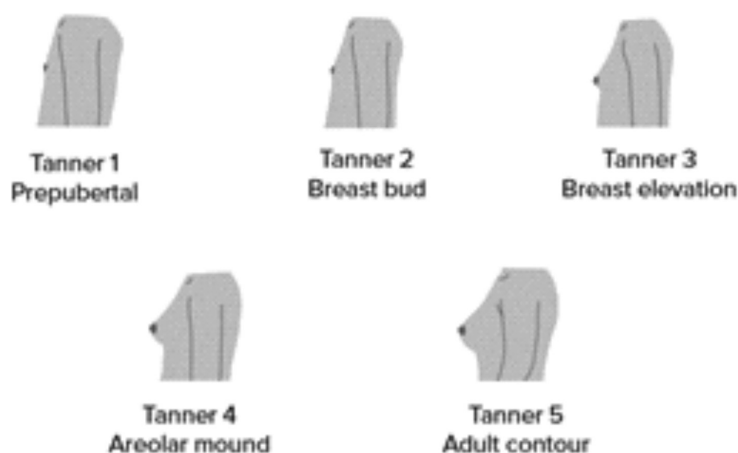


Figure 1: Tanner staging of breast (Lecturio, 2020)

In most girls menarche occur in stage IV and menarche occurs in 10% of girls in stage V (Tindyebwa, 2004). Many studies done in different parts of world showed a reduction in mean age of menarche (Kaplowitz, 2006; Wickramasinghe *et al.*, 2009; Wyshak and Frisch, 1982). According to

Dutta and Gupta who have examined the recorded data to study the trend in menarcheal age, from the writings of the authoritative Indian legislators during the period between ca.500 B.C. and 500 A.D., almost all of the legislators in their writings indicated that the age of menarche was at 12 and full completion of puberty took place at age 16 (Datta and Gupta, 1981). In conclusion, during the period from 4th century B.C. to 7th century A.D., the average age at menarche appears to have been 13 to 14 years (Backman, 1947; Diers, 1974).

Menopause is retrospectively defined as the cessation of spontaneous menses- amenorrhoea for 12 months (Takahashi and Johnson, 2015). Worldwide, most women enter menopause between the ages of 49 and 52 years. Secular trends in ANM have been documented in many studies across the world (Park, Lim and Park, 2018; Costanian, McCague and Tamim, 2018; Dratva *et al.*, 2009; Flint, 1997; Rödström *et al.*, 2003; Shinberg, 1998; Varea *et al.*, 2000). Aristotle in his writings referred to age at menopause being 40 years as early as the 4th century B.C. Initial records of classical period first considered 40 year as the typical age for menopause (Diers Amundsen, 1969). Loss of endogenous estrogen and progesterone stimulation causes the breast to become less glandular and fattier with advancement of age and menopause (Gertig *et al.*, 1999). Due to the changes of its composition breasts become less firm and lose their shape. There may be associated various degrees of breast ptosis. Breast ptosis is characterized by an inferior descent of the nipple relative to the inframammary fold (IMF) and lower pole skin redundancy of the breast. Standardized photographs are examined to determine degree of ptosis by the Regnault classification (Arefanian *et al.*, 2018). Breast ptosis grading system proposed by Regnault *et al.* (1976).

- Normal: areola above the inframammary fold (IMF) and above the gland contour
- Grade I: areola at the IMF and above the gland contour
- Grade II: areola below the IMF and above the gland contour
- Grade III: areola below the IMF and below the gland contour
- Pseudoptosis: areola at the IMF with glandular ptosis
- Parenchymal Maldistribution: areola at the IMF with loose, hypoplastic glandular skin.

From 1890 attention of archeologists was directed towards ancient paintings situated in a crevice in the rock-face, aerial palace of sigiriya, lion Staircase and a highly polished plaster wall called 'the Mirror Wall' or *Ketapathpawura*, which contains inscriptions of visitors to the site between the sixth and fourteenth centuries.

After the initial telescopic observation by Ryes Davis, systematic investigations into the paintings were conducted by H.C.P Bell, Longhurst, Senarath Paranavitana, Senaka Bandaranayke and recently Benil Priyanka to explore artistic and technical aspects of sigiriya paintings mostly based on writings that were found on the mirror wall (Dissanayaka, 2011).

For the sake of coherent identification archeologists have categorized these units in to fresco pockets labeled A, B,C,D and E. Female figures in pocket B are literally slightly larger than figures in pocket A where figures have been created in life-sizes (Dissanayaka, 2011).

The verses written on the Mirror Wall refer to many facts on the number and the content of paintings including five hundred frescoes named 'golden-coloured ones' depicted on the western rock face (Paranavitana, 1956b; Paranavitana, 1961). In the literature two broad categorizations can be identified regarding the subject of the paintings. Some scholars claim that these figures are a depiction of human beings. According to their allusion the subjects of the frescoes could be queens, princesses and maidens. H.C.P Bell, Nandadeva Wijesekara, Nandana Chutiwongs, L Prematilleke and Roland

Silva propose the aforementioned idea in their studies (Wijesekera, 1959; CūṭivoṅGs, Prematilleka and Silva, 1990). A group of scholars including Coomaraswamy, Hocart, Paranavitana, A.H Mirando, Raja de Silva and Senaka Bandaranayake declares that these figures are a portrayal of celestial beings, may be either semi-divine nymphs known as *apsaras*, or a goddess/female divine being (Coomaraswamy, 1927; Codrington and Hocart, 1947; Deraniyagala, 1951; Bandaranayake, 2005; De Silva, 2002; De Silva, 1990).

As stated above H.C.P Bell interpreted these frescoes as royal women and maidens of the court of Kassapa on their way to the Piduragalama monastery located in the vicinity (Bell, 1897). Old verses on the mirror wall- verse 84, 130, 136 and 147 in Sigiri graffiti volume 2 partly explicate the aforesaid opinion. V.A Smith interpreted female figures as noble ladies and their maids on their way to a temple to make offerings (Smith, 1911). Benjamin Rowland elucidated the whole representation of female figures as a celestial parade of opulent females advancing singly and in pairs bearing floral offerings (Rowland and Coomaraswamy, 1938). E. B. Havell in his book named Indian sculpture and painting declared that the frescoes were a representation of a dream of a royal lady's visit to the heaven called Tusita which was a heaven encountered in Buddhist literature (Havell, 1928). Nandadeva Wijesekera claimed that these figures were of women going on pilgrimage to Pidurangala. Arguing the opinion of Wijesekera, Mahinda Somathilaka indicated that the only feature that supports the appearance suitable for pilgrimage purpose was bearing flowers in their hands (Somathilaka, 2004; Wijesekera, 1964).

Ananda K Coomaraswamy interpreted the paintings as semi-divine beings – nymphs or Apsara. He fortified his hypothesis by highlighting clouds painted below the waist line. In the paper 'The Subject of Sigiri Painting' written by Paranavitana, he interpreted the paintings as a type of goddesses quoting the artistic symbolization of Cloud Damsels (Meghalata) and Lightning Princesses (Vidjukumari) for the ornamentation of important monuments in religious context which can also be found in the garbha of the Mahathupa, in ancient Ceylon (Paranavitana, 1947). According to Paranavitana artists were commanded by the king to draw these female divine figures to glorify his image as god king (Paranavitana, 1950). The possibility of ancient Sinhala artists being influenced by the literature has been stressed out by Dulma Karunaratna by drawing attention to 'kenthipuththa' their story of Sihalavaththu wain which features of a siren were illustrated (Buddhadathth, 2002) and she has noticed an analogy between aforesaid descriptions and female figures in sigiriya (Karunaratna, 2010).

Raja de Silva proposed a revolutionary interpretation to the frescoes. He stated that the site was a monastic complex and the paintings were representations of the goddess Tara. He fortified his hypothesis indicating resemblance of hand gestures of Sigiri frescoes to hand gesture commonly used in Mahayana Tara goddess illustrations like 'kataka-hastha' and 'nilothpala'. Distinctive features of paintings and sculptures in Mahayana tradition can also extensively be observed in female figures portrayed in sigiriya, according to Raja de Silva (De Silva, 2002). In the verses scribbled on the mirror wall, the ancient poets abundantly mentioned attractive young females with full blown breasts, called *pin piyovuru* in Sinhala among paintings of female figures. A very few verses including graffiti 71 gives evidences of paintings of females that belong to a more mature age group where the apparent physical features of drooping breast- *batitana* were spotlighted. Raja de Silva has briefly mentioned some features suggestive of young female (slim waist) and of adult females (skin folds/wrinkles in belly) which were subjective observations. Senarath Dissanayaka in his book 'sigiriya' objectively mentioned that the figure 5A [5<sup>th</sup> female figure of the pocket A] was definitely a figure of ugly and old female (Dissanayaka, 2011). Nevertheless, either the absolute or the relative age limits of the female figures portrayed in sigiriya have not yet been elucidated in the literature. So it is not scientifically obvious what the age limit of female figure of sigiriya frescoes is. Therefore, the purpose of this study

was to propose a probable age limit for the female figures analyzing existing medical and archeological evidences.

### **Methodology: Field and Approach**

Sigiriya the renowned World Heritage Site inscribed by UNESCO under criterion II, III, and IV of the operational Guidelines (World Heritage Committee, 1977 ; World Heritage Committee, 2005; World Heritage Committee; 2019), is located in the Matale District of Central Province, in Longitude: 80.760031 Latitude: 7.9571725 Elevation: 265m / 869feet(elevation.maplogs.com, n.d.)about fourteen miles N.E. of Dambulla, and nearly about seventeen miles W. of Pulastipura(Rhys Davids, 1875). The massive rock which is geographically an inselberg is centered by the major urban complex (Bandaranayake, 1997). Only 19 complete female figures and 4 remnants of 3 female figures were preserved to the modern days (Bandaranayake and Jayasinghe, 1986). All survived female figures are preserved in fresco pocket A and fresco pocket B, which are two adjacent depressions in the rock –face (Dissanayaka, 2011).

### **Data Collection**

Firstly a thorough literature survey was conducted at two levels in order to explore, a. biological and medical evidences on the anatomy of female breast, breast changes with reference to reproductive cycle of females[menarche and menopause] and methods of assessing breast changes mainly focusing on its' relation to chronological age.b. historical background of sigiriya rock fortress and female figures portrayed in fresco pockets and the theories and views on the subject of the paintings.Online databases, libraries of universities and personal repositories were referred for the purpose of conducting the literary survey. For the sake of comprehensiveness, experts in relevant fields were contacted over the phone and in-person interviews were also done.

### **Data Analysis: Inclusion and Exclusion of Frescoes**

The study site was visited by the researcher for close observation of paintings in fresco pockets. Observation was completed by detailed telescopic examination of frescoes for the sake of comprehensive identification of features. As the photographing the frescos was prohibited by the rules and regulations of central cultural fund, Sri Lanka, scanned images from previous academic works and images from online stocks were used in this study. All selected images were colour balanced and adjusted in quality using photo editing softwares. Selected digital images of female figures were inspected thoroughly to determine the tanner stage and to grade breast ptosis. Paintings in which the upper body was covered with jacket and figures that could not adequately be examined for the breast anatomy were excluded in this study to maintain the consistency of results.Paintings of female figures were selected from fresco pocket B. In current study fresco *B3, B5, B7, B9, B10, B12, B13* were assed to determine the age limit.

### **Proposing the Probable Lower Limit of Age to Female Figures**

Menarche occurs in 2% of girls late in stage III and 10% of girls in stage V and. In most girls menarche occurs in tanner stage IV breast development. In a case where the assessed breast development was of tanner stage 5, the females could logically be deduced menarche has been attained. Considering limited available data as elaborated in previous sections in detail the age of menarche during king Kashyapa's time (477-495 AD) was considered 14 years. Tanner stage itself has many limitations in determining the chronological age. That should be emphasized that therefore tanner stage of the breast development was not directly used to determine the age in this study (Bednarek, 2006; Rosenbloom



and Tanner, 1998). Rather the tanner staging of the breast development was used in context to the age of menarche and its relation to tanner stage breast development to propose more scientific proposition on the lower limit of the female figures. In summary, for the current study a female figure with tanner stage 5 breast development was considered to have attained menarche and the age of 14 years was considered the lower limit of age of selected female figures. The staging system has been elaborated in previous sections.

### Proposing an Upper Limit of Age to the Female Figures

The menopause marks a significant milestone of female reproductive life (Abetew *et al.*, 2011). As illustrated in previous sections body undergoes substantial anatomical as well as physiological changes due to alternations in circulating sex steroid hormones levels.

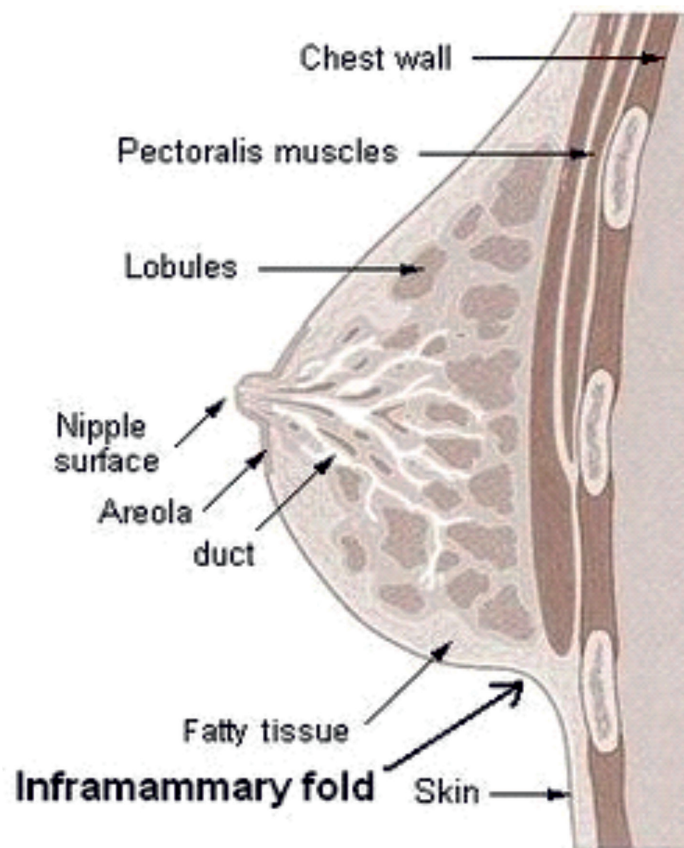


Figure 2- infra mammary fold and nipple areolar complex  
(Cross section of the breast of an adult, female human, n.d.)

Female breast also undergoes some significant changes with the menopause including reduction in firmness, alternation of the shape and various degrees of breast ptosis and among many causes of breast ptosis, menopausal effect is one of the major causes. Breast ptosis which could be scientifically assessed utilizing grading system-Regnault classification was considered to objectively propose the upper age limit. To determine the Regnault stage inframammary fold which is anatomically defined as the area where the skin of the lower pole of glandular breast tissue meets the chest wall forming a groove known as the inframammary crease was drawn on selected figures (Lockwood, 1991). As no classification with visual inspection yield exact chronological age, that should be highlighted that degree of breast ptosis was analyzed in current study with regard to menopausal state. According to

previous studies most of menopausal women were having some degree of ptosis. In the current study, in the absence of breast ptosis that was deduced that the female has not menopausal, indirectly excluding the other etiologies of breast ptosis. Considering the scarce resources on the age of menopause in the literature, age of 40 years was considered the age of menopause during the time period king Kashyapa ruled this country.

In summary, for the current study a female figure with no evidence of breast ptosis was considered to have not menopausal and thus the age of 40 years was considered the upper limit of age of selected female figures. The staging system has been elaborated in previous sections.

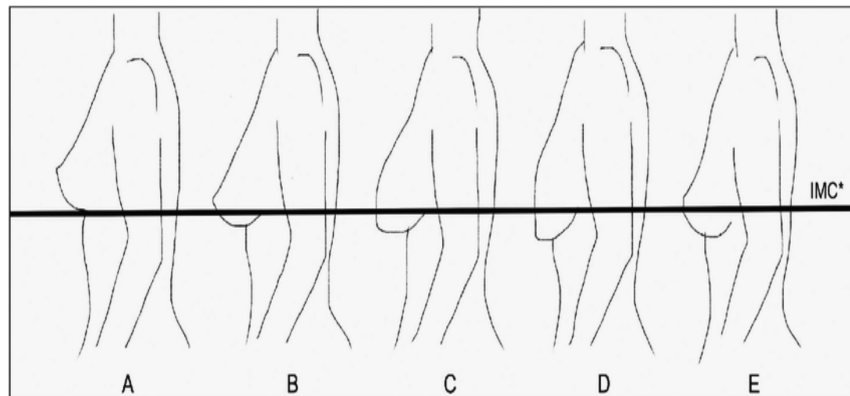


Figure 3: Regnault classification of breast ptosis -comparison (GulhimA and Arora, 2017)

## Results and Discussion

In this chapter selected figures were analyzed based on Tanner staging of female breast and Regnault grading for breast ptosis.

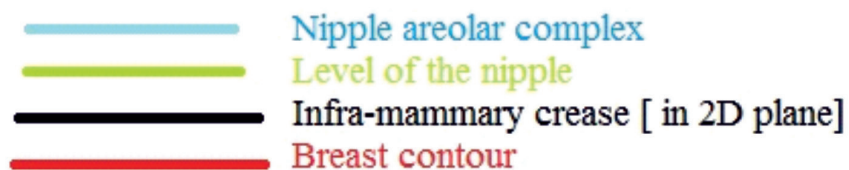


Figure 4: Colour code for pictorial descriptions of anatomy used to analyze female figure

### A. Fresco B7

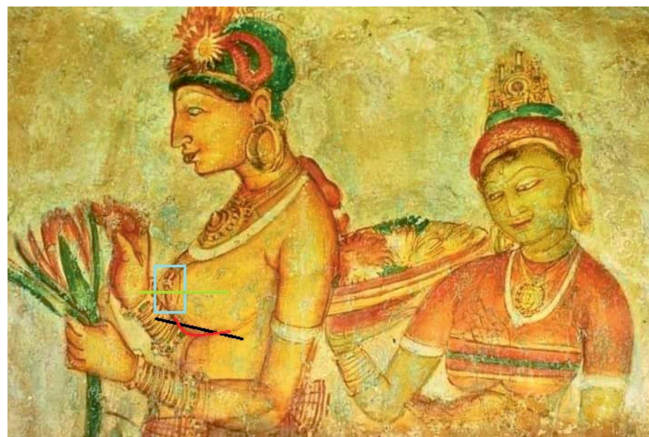


Figure 5: Fresco B7 (Dissanayaka, 201,p. 227) and analyzed features

### Setting the Lower Limit of Chronological Age-Tanner Staging

Single breast contour with areolar hyperpigmentation highlighted by distinctive lines and changes of colour intensity in B7 figure. Nipple protrusion is seen. No greater contour distinction is seen that is the resolution of areolar mounding which is distinctively seen in Tanner stage 4. Adult breast with single contour can be identifiable. Breast development is tanner staging 5. As extensively discussed above in the methodology part, correlating the breast development and age of menarche,

\* **The lower limit of the age -14 years** Setting the upper limit of the chronological age-Regnault classification of breast ptosis, Nipple areola complex is above the inframammary fold (IMF) and above the gland contour. Therefore no breast ptosis is seen. As extensively justified in the methodology part, correlating median age of menopause and degree of breast ptosis,

\***The upper limit of age – 40 years**

**Proposed age limit for fresco B7- 14 years to 40 years**

### b. Fresco B9

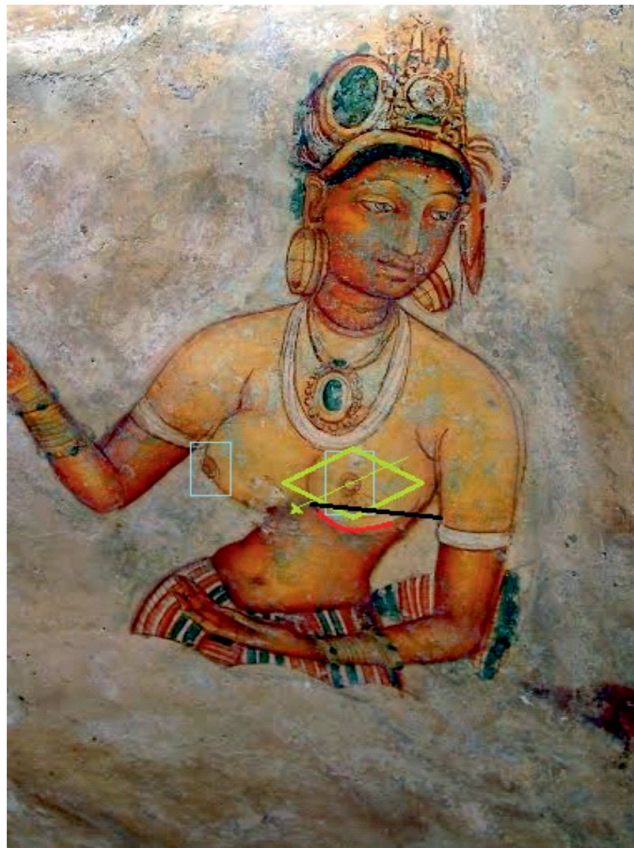


Figure 6: Fresco B9 (Dissanayaka, 201,p.229) and analyzed features

### Setting the Lower Limit of Chronological Age-Tanner Staging

Single breast contour with areolar hyperpigmentation highlighted by distinctive lines and changes of colour intensity in B7 figure. Nipple protrusion is seen. No greater contour distinction is seen that is the resolution of areolar mounding which is distinctively seen in Tanner stage 4. Adult breast with single contour can be identifiable. Breast development is tanner staging 5. As extensively discussed above in the methodology part, correlating the breast development and age of menarche,



**\* The lower limit of the age -14 years Setting the upper limit of the chronological age-Regnault classification of breast ptosis**

Nipple areola complex is above the inframammary fold (IMF) and above the gland contour. Therefore no breast ptosis is seen. As extensively justified in the methodology part, correlating median age of menopause and degree of breast ptosis,

**\*The upper limit of age – 40 years**

*Proposed age limit for fresco B9- 14 years to 40 year*

**c. Fresco B12**

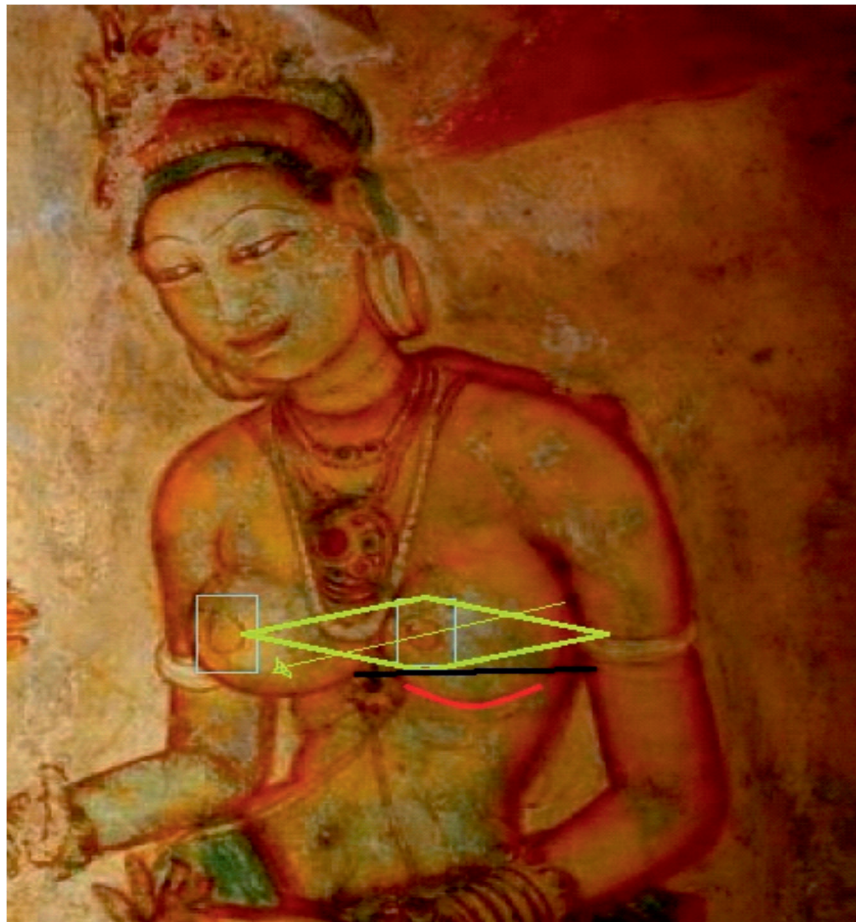


Figure 7: Fresco B12 (Dissanayaka, 201,p.233) and analyzed features

**Setting the Lower Limit of Chronological Age-Tanner Staging**

Single breast contour with areolar hyperpigmentation highlighted by distinctive lines and changes of colour intensity in B7 figure. Nipple protrusion is seen. No greater contour distinction is seen that is the resolution of areolar mounding which is distinctively seen in Tanner stage 4. Adult breast with single contour can be identifiable. Breast development is tanner staging 5. As extensively discussed above in the methodology part, correlating the breast development and age of menarche.

**\* The lower limit of the age -14 years Setting the upper limit of the chronological age-Regnault classification of breast ptosis**

Nipple areola complex is above the inframammary fold (IMF) and above the gland contour. Therefore no breast ptosis is seen. As extensively justified in the methodology part, correlating median age of menopause and degree of breast ptosis,

**\*The upper limit of age – 40 years**

**Proposed age limit for fresco B12- 14 years to 40 years**

#### ***d. Fresco B13***



**Figure 8: Fresco B13 (THE DAMSELS OF SIGIRIYA, n.d.) and analyzed features**

#### **Setting the lower limit of chronological age-Tanner staging**

Single breast contour with areolar hyperpigmentation highlighted by distinctive lines and changes of colour intensity in B7 figure. Nipple protrusion is seen. No greater contour distinction is seen that is the resolution of areolar mounding which is distinctively seen in Tanner stage 4. Adult breast with single contour can be identifiable. Breast development is tanner staging 5. As extensively discussed above in the methodology part, correlating the breast development and age of menarche,

**The lower limit of the age -14 years setting the upper limit of the chronological age-Regnault classification of breast ptosis**

Nipple areola complex is above the inframammary fold (IMF) and above the gland contour. Therefore no breast ptosis is seen. As extensively justified in the methodology part, correlating median age of menopause and degree of breast ptosis,

**The upper limit of age – 40 years**

***Proposed age limit for fresco B12- 14 years to 40 years***

#### ***e. Fresco B3***



**Figure 9: Fresco B3 (one of the Sigiriya fresco – vandalized by an offended villager?, n.d.) and analyzed features**

### **Setting the lower limit of chronological age-**

#### ***Tanner Staging***

Single breast contour with areolar hyperpigmentation highlighted by distinctive lines and changes of colour intensity in B7 figure. Nipple protrusion is seen. No greater contour distinction is seen that is the resolution of areolar mounding which is distinctively seen in Tanner stage 4. Adult breast with single contour can be identifiable. Breast development is tanner staging 5. As extensively discussed above in the methodology part, correlating the breast development and age of menarche,

**\* The lower limit of the age -14 years Setting the upper limit of the chronological age-**

Regnault classification of breast ptosis

Nipple areola complex is above the inframammary fold (IMF) and above the gland contour. Therefore no breast ptosis is seen. As extensively justified in the methodology part, correlating median age of menopause and degree of breast ptosis,

**\*The upper limit of age – 40 years**

***Proposed age limit for fresco B3- 14 years to 40 years***

#### ***f. Fresco B5***



**Figure 10: Fresco B5 (Живопись, n.d.) and analyzed features**

## Setting the lower limit of chronological age

### *Tanner Staging*

Single breast contour with areolar hyperpigmentation highlighted by distinctive lines and changes of colour intensity in B7 figure. Nipple protrusion is seen. No greater contour distinction is seen that is the resolution of areolar mounding which is distinctively seen in Tanner stage 4. Adult breast with single contour can be identifiable. Breast development is tanner staging 5. As extensively discussed above in the methodology part, correlating the breast development and age of menarche,

*\* The lower limit of the age -14 years*

## Setting the upper limit of the chronological age-

### Regnault classification of breast ptosis

Nipple areola complex is above the inframammary fold (IMF) and above the gland contour. Therefore no breast ptosis is seen. As extensively justified in the methodology part, correlating median age of menopause and degree of breast ptosis,

*\*The upper limit of age – 40 years*

*Proposed age limit for fresco B5- 14 years to 40 years*

### *g. Fresco B10*



Figure 11: Fresco B10 (Dissanayaka, 201,p.231) and analyzed features

## Setting the lower limit of chronological age

### *Tanner Staging*

Single breast contour with areolar hyperpigmentation highlighted by distinctive lines and changes of colour intensity in B7 figure. Nipple protrusion is seen. No greater contour distinction is seen that is the resolution of areolar mounding which is distinctively seen in Tanner stage 4. Adult breast with single contour can be identifiable. Breast development is tanner staging 5. As extensively discussed above in the methodology part, correlating the breast development and age of menarche,



**\*The lower limit of the age -14 years setting the upper limit of the chronological age-**

### **Regnault classification of breast ptosis**

Nipple areola complex is above the inframammary fold (IMF) and above the gland contour. Therefore no breast ptosis is seen. As extensively justified in the methodology part, correlating median age of menopause and degree of breast ptosis,

**\*The upper limit of age – 40 years**

***Proposed age limit for fresco B10- 14 years to 40 years***

### **h. Deductive chronological age limit of selected female figures - Fresco B3, B5, B7, B9, B10, B12, B13**

According to analyzed results, for all the frescoes in the selected sample

- The lower limit of the chronological age -14 years
- The upper limit of the chronological age - 40 years

**Proposed age limit for female figures analyzed - 14 years to 40 years**

## **Discussion**

The results indicate that the chronological age limit for female figures analyzed in the current study is 14 years to 40 years determined objectively by using grading systems practiced in medicine. Even though there are several scholarly interpretations regarding the subject of the paintings in the literature, an age limit determined objectively has not been taken into account when postulating the subject of sigiriya frescoes. Raja de Silva in his work has indicated a rough postulation on the age of female figures. According to him young females were painted with slim waist and in figures of matured women the belly skin was appeared to have nearly 3 wrinkles. Nonetheless the terms ‘young’ and ‘mature’ are neither objective nor give a scientifically valid chronological age. Furthermore the slimness of waist and the wrinkles of the belly skin cannot be objectively used to comment on the chronological age though the measured waist circumference can be utilized with the height measured in indexes like waist circumference density index (WCDI) as effective parameter for evaluating biological age [ $WCDI = \text{weight (kg)} \div [\text{height (m)}(0.5) \times WC (m)(2)]$ ] (Zhao *et al.*, 2013) which certainly has extreme practical limitations when applying to paintings, figures and pictures. Content of the verse 71 of Sigiri graffiti which was sung in reference to a female figure of more mature age group indicated the apparent physical features of drooping breast- *batitana*. In the current study the upper limit of the chronological age of all selected frescoes were came as 40 years. The upper limit of female figures was deducted based on breast ptosis classification [Regnault classification] and on the fact that the menopause is a major cause of breast sagging. Absence of breast sagging was used to deduce the menopausal state and the average age of menopause therefore the upper limit of chronological age. The poet might have come to the decision that the female was of mature age depending on the physical features of the breast he had observed most probably without an objective assessment.

As no selected female figure in current study was found to have breast sagging, the interpretation made by the ancient poet can be explained in two schemes depending on the results of current study. First possibility is that, considering the fact that there were more than five hundred frescoes named ‘golden-coloured ones’ depicted on the western rock face (Paranavitana, 1956b), the female figure subjected to the aforesaid verse has been eroded in the course of time and has not been survived

to modern days. The other possibility is that the female breast observed and labeled as a drooping breast by the poet did not actually have breast sagging instead the female figure which was subjected to the aforementioned verse had pseudoptosis that is no real breast sagging though appeared to have so. According to Regnault classification a loose breast that looks ptotic or sagging from a distance with the nipple remaining above the inframammary fold is classified as pseudoptosis (Regnault, 1976). Senarath Dissanayaka objectively mentioned that the figure 5A [5<sup>th</sup> female figure of the pocket A] was obviously a figure of ugly and old female arguing the opinion of *Tara Devi* proposed by Raja de Silva. Only the facial of the fresco A5 is clearly visible for visual inspection (Dissanayaka, 2011). Arriving at a decision on the age of a female figure solely based on facial features and the colour should be further queried. As the age limit of all the female figures analyzed in current study was 14-40 years the possibility of drawing a female figure of old and ugly lady among ideal female figures is extremely low.

As no study in the available literature has determined the objective age of the female figures painted in frescoes, results of the current study can be applied in analysis of subject of female figures portrayed in fresco pockets. Elucidations including Sigiri graffiti verses referring to ladies mourning at the death of the king -their lover (Paranavitana, 1956b), H.C.P Bell's interpretation and V.A Smith's interpretation by which frescoes were interpreted as royal women and maidens of the court, are supported by results of the current study. There is a higher chance of these frescoes depicting wives of king Kashyapa I as the age limit derived from current study is in between 14 -40 years. The age group included in the age limit proposed is the reproductive period of females. This factor is further reinforced by evidences found in the Dhammapadaṭṭha commentary [assigned to the fifth century AC] in which sixteen was considered the adult age for a girl to be given in marriage (Norman, 1911) and in the DhampiyaAṭuvāGāṭapada of the tenth century AC which mentioned fifteen or sixteen as the suitable age for girls to be given in marriage (Jayathilake, 1933)

Coomaraswamy, Hocart, Paranavitana, A.H Mirando, Raja de Silva and Senaka Bandaranayake in their studies declared that these figures were a portrayal of celestial beings, either semi-divine nymphs known as *apsaras*, or a goddess/female divine being (Coomaraswamy, 1927; Codrington and Hocart, 1947; Deraniyagala, 1951; Bandaranayake, 2005; De Silva, 1990; De Silva, 2002). In classical written literature including *Kavsilumiṇa* of Dambadeniya period and *Jānakīharaṇaya* of Anuradhapura period, female beauty was described emphasizing physical features of the beauty: beauty of the breasts, slimness of waist, wideness and fullness of hip in addition to delightful facial features, ornaments and jewelry (Parākramabāhu and Śrī Sōrata, 1966; Kumāradāsa and Godakumbura, 1969). Aforesaid texts also pointed out their [women in king's harem] resemblance to female divine and semi divine beings. Additionally *udana pāḷiya* has given an account on features of an *apsara*: semi divine nymph (Somalokatissa, 1966). The deduced age limit of 14-40 years in current study is in consistent with those explanations. Before the puberty the breast is not fully developed and features of full blown breast cannot usually be appreciated. Similarly after the menopause the body undergoes several changes including reduction in breast firmness and alternation of breast shape (Gertig *et al.*, 1999). As it is obvious that in afore-cited written classical literature resources the full blown female features have been extensively appreciated rather than appreciating feminine features which are either underdeveloped or features of aged women, in case of aesthetic portrayal of female figures by ancient master artists the probability of depicting sigiriya female figures based on similar criterion is naturally high. Therefore the results of current study scientifically fortify the scholarly idea that the sigiriya frescoes are a depiction of celestial beings, to a certain extent.

## Limitations

Determination of the chronological age limit of female figures portrayed in sigiriya fresco pockets was objectively carried out only by assessing the appearance of the breast utilizing grading systems currently used in field of medicine. Facial changes and changes in other regions of the bodies of female figures were not considered due to lack of objective grading systems to assess those regions in respect of determining chronological age. All the viable frescoes were not included in this study. Some frescoes were excluded from the study due to limitations in interpretation of those i.e. upper body covered with jacket, trunkal region destructed or faded, in order to maintain the consistency of interpretations.

## Suggestions

Based on the problems identified during this study, few suggestions could be made in order to improve this research. In determining the chronological age of female figures changes of the other parts of the body with puberty and aging can be included at different stage following the determination of probable age limit. Physical changes accounting to life events of female i.e. pregnancy, breastfeeding can also be incorporated to determine a narrower age limit and categorize female figures under different age groups in future studies.

## Conclusion

The age limit of the selected female figures portrayed in fresco pockets is in between fourteen years to forty years. This finding is in accordance with several scholarly interpretations on the subject of paintings and also provides scientific fortification to existing opinions and interpretations on the subject of paintings.

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