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Authors	King, Robert J.
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UCC
University College Cork, Ireland
Coláiste na hOllscoile Corcaigh

Baby got Back: Some Brief Observations on Obesity in Ancient Female Figurines: Limited Support for Waist to Hip Ratio Constant as a Signal of Fertility

Introduction

A recent article (1) drew attention to the wide range of body types represented in ancient representations of female forms—such as the famous Willendorf Venus figurine. Such artworks are of obvious intrinsic historical interest. They may also offer insights into the health and lifestyles of our recent ancestors (1, 2). The original role of such figurines is still somewhat disputed—for example as to whether they constitute examples of ancient beauty ideals or were fertility symbols (2). It could be that different representations may serve a range of functions. Jozsa (1) is to be commended for analysing several interesting aspects of body composition deposition in ancient figurines—such as shoulder to hip ratio and an estimate of body weight. Such research prompts the further thought that if another key measure of female health and fertility—namely waist to hip ratio (3) is also included in the analysis then an even more complete picture will be obtained.

There may be practical health issues at stake--beyond those of historical analysis alone. For example, some have argued that a link can be made between female sexual dysfunction—specifically female inorgasmia during intercourse--and obesity (4). However, this latter finding seems to stand somewhat in contradiction to the not uncommon modern fetish for larger females (5). If such a sexual preference does not involve female orgasm then this would stand in need of explanation. This is because a large part of the pornography industry caters to the production of representing convincing female orgasms to males (6). For preferences to have become ingrained in humans it would be expected that clear patterns of preference would track local ecologically-mediated signals of fecundity. If this had not been true then those without such preferences would have been out-competed by those who

possessed them—or possessed them to a greater degree (7). If ancient males did not, on average, display preferences that tracked locally mediated markers of fertility then they would be less likely to have descendants (8).

Despite this evolutionary truism, the relationship between female sexual dysfunction and fertility is not clear cut. There is indirect evidence for a link between female orgasm and fertility (9, 10, 11, 12). However, to date, the evidence is mixed and hotly disputed (13). Whatever the eventual outcome of this dispute, it should be uncontroversial that anything that leads to lack of female desire, pain during intercourse, or other forms of sexual dysfunction will likely have some marked effect on fertility—if only through reducing the incidence of said activity. This effect has been disputed—for example in the case of slightly increased female fertility despite the pain of FGM/C (13). However any such apparent gains in fertility are more likely explained by covarying cultural controls over female sexual activity and choice (14) than by the putative irrelevance of female desire and sexual enjoyment.

Any effect that lowered female sexual interest would have been even more marked in human history—given the relative lack of medical interventions possible. Therefore, if Venus figurines do represent a deviation from fertility-marking norms then this would be of both historical and medical interest.

Ancient humans--for whom fertility was perhaps an issue vital to the point of worship--made a large number of representations of the female form—known as Venus figurines-- that would likely be regarded as obese today, were they to be actually realised in human form. Such figurines have proportions somewhat like more recent Ibibio females being prepared for marriage. In the case of the Ibibio such fattening seems to be a local marker of wealth and bride value (15,16). Perhaps, in areas prone to famine, such fattening is an honest signal of wealth rather than fertility, per se, although one might expect the two to covary as a hard to

fake signal (17). Finally, it is entirely possible that such figurines were not intended to be accurate representations of any living human females of the time. They may be highly stylised exaggerations, votive offerings, or have some other symbolic function yet to be guessed at.

Whatever the truth of the foregoing, we can be sure that fertility mattered a great deal to our ancestors and that they were non-accidentally attracted to the signs of it in one another. One perspective on the accuracy of such figurines is to compare their proportions with modern preferences. It has been found that, with few exceptions, there is a robust modern cross-cultural preference for a waist to hip ratio of 0.7 in human females (3). Male preferences for relative obesity have been found to possibly vary according to conditions of food scarcity—perhaps mediated by SES which is itself an index of cues to resource allocation (5, 18).

However, proportionality is not the same as absolute obesity. It is to be expected that in representations of non-pregnant females a 0.7 proportionality that indicates fecundity—via indicated estradiol levels--should be preferred across time and space. Furthermore, this should occur irrespective of absolute female size (3).

Methodology

There are about a hundred objects that have been termed Venus figurines. They are all Upper Paleolithic art objects that are mostly associated with the Gravettian, Solutrean and Aurignacian periods. The earliest discovered is the Venus of Hohle Fels and has been dated to at least 35000 BCA. The latest that belongs in this category is the Venus of Monruz—dated to 11000 years BCA (19).

Measuring Venus figurines is not as simple as it might first appear. For a start, the originals are scattered across the globe in a multiplicity of museums and even if access is gained to the

originals--they are fragile and irreplaceable. Thus, it is necessary to rely on photographs. Fortunately many high quality photographs of the major finds are available—for example at (20).

Venus figurines are carved in soft stone—such as limestone—therefore many have been worn to the point of making proportions non-measurable. While many figurines are easy to see in photographs, their front view frequently features pendulous breasts whose size is such that they obscure measurements of the waist. Other figurines have representations of arms—or sometimes chains—in the case of the Kostienki Venus-- in front that also obscure the narrowest point of the waist. Some others—such as the Gagarino Venus, or the Balzi Rossi Venus are held to be representations of pregnant females and/or hermaphrodites (21). Many other figurines are incomplete or broken--such as the Venus of Laugerie Basse (22). There are also controversial reconstructions such as the Schmid reconstruction of the Hohlenstein-Stadel "Lion Lady" (23), and one of disputed provenance—such as those from the Townsend collection. Any such controversial figurines have been excluded from the current analysis.

There are also a host of Late Magdalenian Feminine Plaquettes whose nature are still much in dispute. Whether or not they even represent female figures--there is typically not enough of the full object remaining to measure proportionality. These have also been excluded from analysis. Finally, there are some excellent specimens—such as the Morovany Venus—which were not at the time available in photographs where a clear WTH could be measured (24).

For the present analysis, only those figurines whose photographs are also available in rear view or in unambiguous front view, standing reasonably straight and, not only seen from drawings, facsimiles, or obviously worn down, were used. This is clearly a very restricted sample and considerable caution should be taken to not extrapolate too much from such a group.

Measuring.

The methodology followed standard techniques of measurement in the physical sciences—although perhaps not enough as standard practice in the behavioural sciences (25). First, photographs were produced at the same scale. Second, a ruler was taken and laid down--without first observing the scale boundaries--across the width to be measured. The lower number was then observed, and this was then subtracted from the higher number. For example one end of the scale might have read 16.2 cm and the lower end 12.1cm. The resultant measurement would thus have been 4.1cm +/- 0.1 cm. Given that the rule was marked out in 1mm gradations a +/- of 0.5mm error could occur at either end. This approach is to be contrasted with techniques where the zero point of a ruler in placed at one end and then the length then read off from the other. This latter system—while ostensibly more commonsensical--can multiply systematic errors. A typical example would be errors generated by prior knowledge of the research hypothesis. Resultant fudging of readings—while unlikely to be conscious—can easily occur (25).

Two places were measured in this fashion—the widest point of the hips and the narrowest point of the waist, and ten measurements were taken for each photograph and then averaged. It follows from measurement theory that as the number of measurements taken in this way tends to infinity the measurement error approaches only that which is systematic (rather than random) error (25). In practice, ten measurements will give an estimate which is within the bounds for reasonableness given the source material to be measured (25). All measurements are +/- 1mm. Original measurements available on request

Results

The calculated waist-to-hip ratios are given in *table one*

Table one Waist to hip ratios (rear view only) of Venus figurines

Name	WTH ratio
Willendorf Venus	0.73
Hohle Fels Venus	0.77
Venus Impudique	0.72
Kostienki Venus Figurine #3	0.68
Venus of Laussel	0.74
Mal'ta figurine 1	0.64
Mal'ta figurine 2	0.66
Mauern Venus	0.75
Venus of Menton	0.78
Yeliseevichi Venus	0.56
Lespugue Venus	0.50
Galgenberg Venus	0.71
M	0.69
SD	0.09

With the two possible outliers (Lespugue & Yeliseevichi Venuses) removed from analysis — The WTR $M = 0.72$, $SD = 0.05$.

Discussion

There is mixed support for the hypothesis that an idealised female WTH ratio of 0.7 has been a constant, or near-constant, throughout human history. This would tend to support the hypothesis that males are especially attracted to proportions that signal fecundity (3). However, such results must be treated very cautiously. The sample size taken here is small—this was necessitated by the requirements of clear measuring detailed above. It could possibly be objected that only by including two seeming outliers—namely the Yeliseevichi and Lespugue Venuses—has the average ratio been found to closely approximate to 0.7. However, even with these two (arguable) outliers removed the mean is still very close to 0.7. The question would then arise—what is the likely explanation of such outliers? Are they, for example, deliberately hypertrophied exaggerations of female secondary sexual characteristics? We may never know—but input from archaeological experts would be greatly appreciated.

Further work is clearly needed. One thing that would advance knowledge in this area would be any relevant archaeological perspective on possible outliers. Are there links with known features of diet, ecology, demographic patterns, or climate? Does specialist knowledge—for example of archaeological detail--provide any theoretical grounds for preferring some figurines as being more representative than others? Are there more numerous, or better representations of Venus figurines available? While obesity may well be a general modern health concern, this may be mediated by a number of factors that shed light on why some populations and regions are able to tolerate different proportionalities than others. A fuller picture is likely to obtained by an approach that both emphasises and values consilience between archaeological, medical and biological sciences (26) and commentary in this vein would be particularly welcome.

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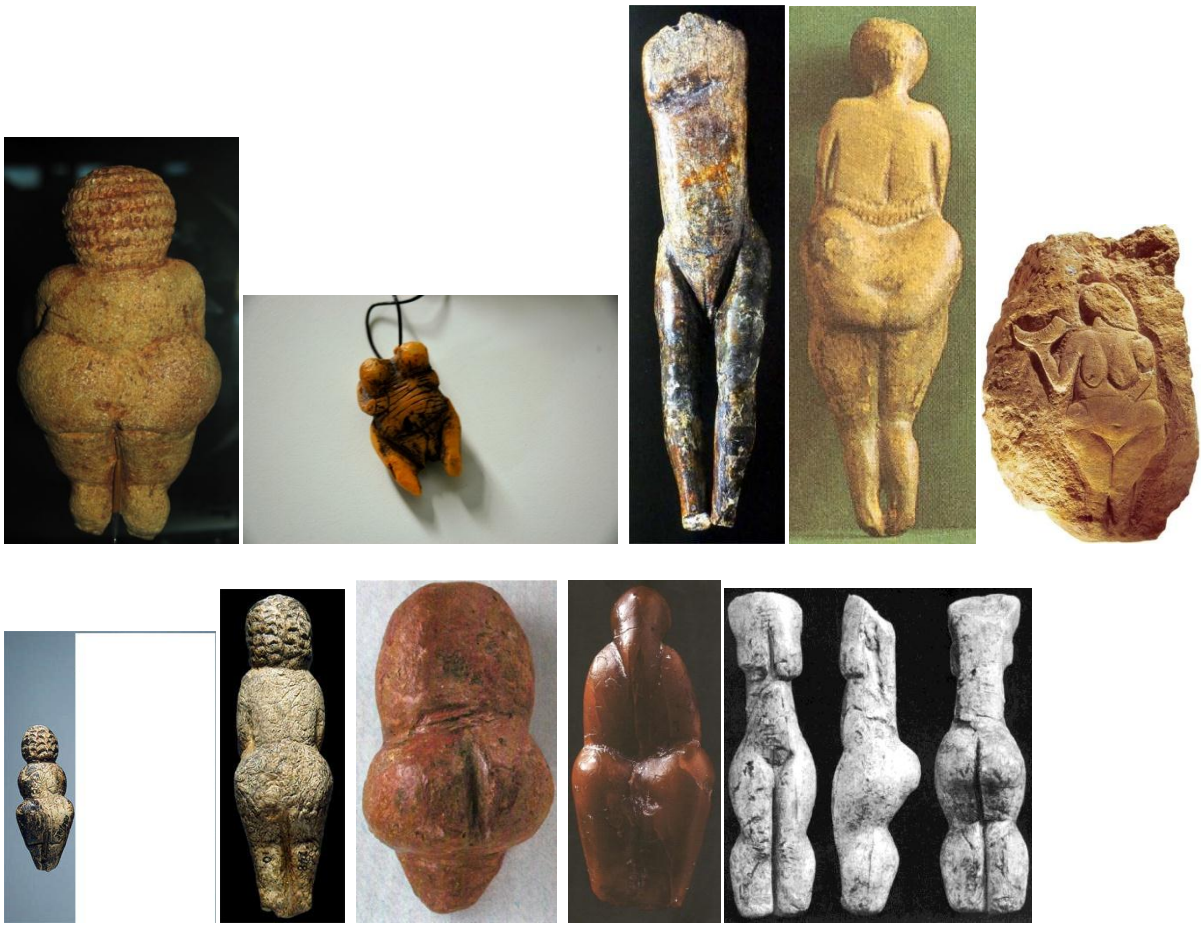
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Appendix One: Examples of Venus Figurines (Rear View)







Examples of Venus figurines.

Willendorf; Hohle Fels; Venus Impudique; Kostienki Figurine #3;Venus of Laussel;

Mal’ta figurine 1; Mal’ta figurine 5; Mauern ; Venus of Menton; Yeliseevichi;

Lespugue; Galgenberg