One foot in the past

The mummy's curse: historical cohort study

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"Can you see anything?" It was all I could do to get out the words, "Yes, wonderful things."

Howard Carter[1]

Abstract

Objective To examine survival of individuals exposed to the "mummy's curse" reputedly associated with the opening of the tomb of Tutankhamen in Luxor, Egypt, between February 1923 and November 1926.
Design Retrospective cohort study.
Participants 44 Westerners identified by Howard Carter as present in Egypt at the specified dates, 25 of whom were potentially exposed to the curse.
Main outcome measures Length of survival after date of potential exposure.
Results In the 25 people exposed to the curse the mean age at death was 70 years (SD 12) compared with 75 (13) in those not exposed (P=0.87 for difference). Survival after the date of exposure was 20.8 (15.2) *v* 28.9 (13.6) years respectively (P=0.95 for difference). Female sex was a predictor for survival (P=0.02).
Conclusions There was no significant association between exposure to the mummy's curse and survival and thus no evidence to support the existence of a mummy's curse.

KOBAL COLLECTION

Introduction

The death in 1923 of George Herbert (Lord Carnarvon), the financier of the expedition that unearthed the tomb of Tutankhamen, unleashed a sensation in the international newspapers. He had developed erysipelas at the site of a mosquito bite, which resulted in septicaemia and pneumonia. The speculation was that his death was due to a "mummy's curse." The press reports of the time had the death of every man and his dog being associated with the curse, no matter how obscure the connection. This was literally the case for Lord Carnarvon as his three legged canine was said to have bayed at the very time his master succumbed and promptly turned up his paws.

As Alb Lythgoe, another individual exposed to the tomb, lay in his hospital bed dying from a stroke, Herbert Winlock, the Director of the Egyptian Section of the Metropolitan Museum of Modern Art in New York, felt compelled to refute the so called curse.[2] He pointed out that at the time (1934) only six of the original 24 people present when the tomb was opened had died. He noted also that Carter had had swabs taken from the sarcophagus and sampled "specimens of air" because of fear of contagion but these had been "absolutely sterile." While we may doubt the veracity of the last statement it is fair to say that there was considerable scepticism by those considered at risk. However the mummy's curse still persists as an urban myth. I investigated whether such a phenomenon exists by comparing the survival of those exposed and unexposed to the mummy's curse using a retrospective cohort design.

Most tombs in Egypt were opened and ransacked in ancient times, usually as "inside jobs" soon after burial. Therefore it is impossible to ascertain if the mummy's curse also applied to these grave robbers. In modern times only one pharaoh's tomb has been discovered relatively undisturbed, that of Tutankhamen. It was found in November 1922 by the British archaeologist Howard Carter, unobtrusively concealed by 20th Dynasty workers' huts in the Valley of the Kings, Luxor. He was leading a dig under the patronage of Lord Carnarvon.

Methods

The mummy's curse is assumed to be a physical rather than a metaphysical entity and therefore only those people physically present at the breach of sacred seals in a previously undisturbed area of the pharaoh's tomb were deemed at risk. It is also assumed that exposure is

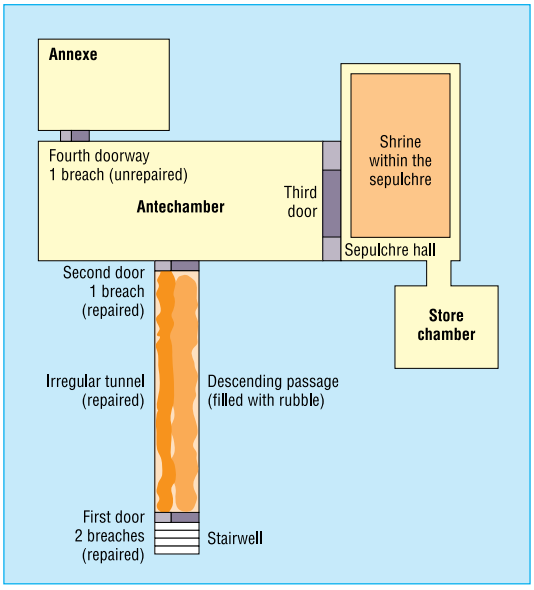

Fig 1 Plan of Tutankhamen's tomb showing previous entry into tomb (not to scale, adapted from *The Tomb of Tutankhamen*[1])

finite so only those who visit and enter the same day were said to be exposed. The tomb of Tutankhamen had been raided in ancient times, possibly on more than one occasion (fig 1). Therefore the opening of the first door, clearing of the passageway, the opening of the second and fourth door, and the clearing of the antechamber and annexe were not thought to put individuals at risk.

I defined exposure to the curse as those Western individuals recorded in the writings of Howard Carter as present at the breaking of the seals and the opening of the third door on 17 February 1923, the opening of the sarcophagus on 3 February 1926, the opening of the coffins on 10 October 1926, and the examination of the mummy on 11 November 1926.[1 3 4] Thus people could have had from one to four exposures to the curse.

For unexposed individuals I used Westerners recorded in Carter's writings as being in Egypt at the time but not recorded by him to have been present at the site at the aforementioned times. I included only Western individuals in the analysis as documentation of this group was more likely to be complete and the life expectancy of Egyptians would be expected to differ from that of Westerners.

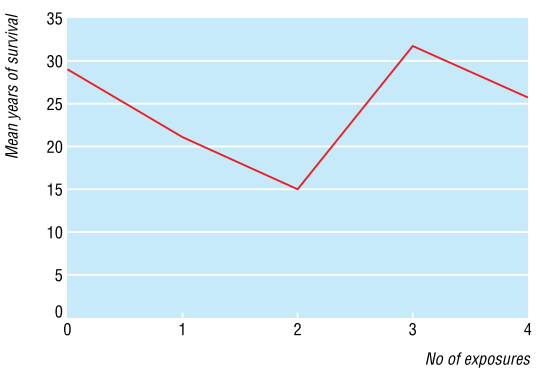

Fig 2 Dose effect of exposure to mummy's curse and mean survival

Dates of birth and death were identified by biographical texts, newspaper obituaries (the *Times*, *New York Times*, *Le Monde*) and a Google web based search.[5–16] I searched with the keywords archaeology, Egyptology, personal name, Egypt, Tutankhamun, and Tutankhamen. For non-archaeologists I searched genealogy, royal, military, and other occupational websites. When I could not establish precise dates, individuals were assumed to have been born or died on June 30 of the year recorded.

Women were mostly ignored in the biographical texts of the time. Therefore it was often possible to identify a date of marriage only through a husband's entry. In such circumstances I assumed a woman to have been born at least 16 years (the legal age for marriage) before this date.

Data were analysed with SPSS for Windows (version 11.0.0). I divided records into those who survived less than or greater than 10 years. I chose the cut off of 10 years because if there was an effect of exposure this would probably occur in the first 10 years. Comparisons were then made by age, sex, and exposure. Survival was analysed by any or no exposure and by number of exposures by logistic regression.

Results

Carter recorded the presence of 44 Westerners in Egypt at the relevant time, of whom 25 were potentially exposed to the mummy's curse. They were members and relatives of Carnarvon's and the Metropolitan Museum of Art's excavation teams, the press, Belgian royalty, British officials and dignitaries, and experts employed by the Egyptian government. I established dates of death for all of those exposed and 11 (58%) of those not. The table lists the characteristics and mean survival of exposed and unexposed groups. Figure 3 shows a dose-survival plot for those exposed to the curse. There were no significant differences for the four groups (analysis of variance F=1.03, P=0.41).

Female sex was a significant predictor of survival (38 *v* 21 years, P=0.017). Adjustment for age and sex, any exposure, or the number of times exposed did not confer additional risk for early (within 10 years) death (odds ratio 1.38, 95% confidence interval 0.20 to 9.6). There was also no effect on survival time for any exposure or number of exposures.

Discussion

The mummy's curse is now widely accepted to be derived from fictional literature. In 1869 Louisa May Alcott, author of *Little Women*, had written a short story called "Lost in a Pyramid: the Mummy's Curse."[17] An alternative source may have been a tale related by the US painter Joseph Smith (1863-1950), who told of a curse on the heretic king Akhenaton, Tutankhamen's

Group comparison of characteristics of people with data on mortality according to exposure to mummy's curse. Figures are means (SD) unless stated otherwise

	Exposed (n=25)	Unexposed (n=11)	P value
No (%) of men	24 (96%)	7 (64%)	<0.001
Age at classification (years)	49.3 (11.0)	44.1 (9.1)	0.25
Age at death (years)	70.0 (12.4)	75.0 (13.0)	0.87
Survival (years)	20.8 (15.2)	28.9 (13.6)	0.95

What is already known on this topic

The methods of evidence based medicine have not been used to investigate the reality of the "mummy's curse"

The arguments against the curse have been as anecdotal as the contemporary newspapers that reported it

What this study adds

There was no association between potential exposure to the mummy's curse during the excavation of Tutankamen's tomb and death within 10 years

No evidence was found for the existence of a mummy's curse

father-in-law. Akhenaton (ruled 1353-35 BC) displaced the traditional pantheistic worship by combining the hundreds of deities into one: Ra, the disc of the sun.[18] On his demise the vengeful priests were said to have damned "his body and soul … to wander separately in space and never to be reunited for all eternity." Tutankhamen inherited the throne through marriage to the third daughter of Akhenaton after the death of the older two daughters. There is speculation that the priests had Tutankhamen murdered to further their own ambitions.[19] The chief priest, Ay, inherited the throne on Tutankhamen's death.

Howard Carter was a professional archaeologist and therefore had no time for the curse, declaring that "all sane people should dismiss such inventions with contempt."[16] He had meticulously and carefully excavated the tomb to allow photographic recording of the exact position where objects were found and the preservation of items and the tomb itself. This was a painstaking process conducted over several years, interrupted by political infighting over who had the right to exploit such a find. He received assistance from American experts from the neighbouring excavation of the Egyptian Department, the Metropolitan Museum of Art, New York, and officials and employees of the Egyptian government. These groups made up the bulk of the cohort studied.

Limitations of study

My study has several limitations. Exposed people were more likely to be involved with the dig and therefore be mentioned in print. Hence there was a difference in the completeness and accuracy of data between the exposed and unexposed groups. There was a sex difference as spouses of professionals in the 1920s was more likely to be women and therefore over-represented in the unexposed group. The definition of exposure may also be questioned with the possibility of contamination of the "unexposed" if the curse acted longer or more widely. Carter recorded that the season after the discovery saw over 12 000 visitors to the site and therefore in the absence of an ensuing epidemic it was thought to be reasonable to limit the period to one day. The small numbers analysed, however, resulted in wide confidence intervals, and the study may have been underpowered to show a more subtle adverse effect.

Conclusion

An Egyptian archaeological dig in the 1920s was inhabited by interesting characters and it was this and the circumstances of the archaeological find of the modern age that has kept the myth of the mummy's curse in the public eye. I found no evidence for its existence. Perhaps finally it, like the tragic boy king Tutankhamen, may be put to rest.

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Competing interests: None declared.

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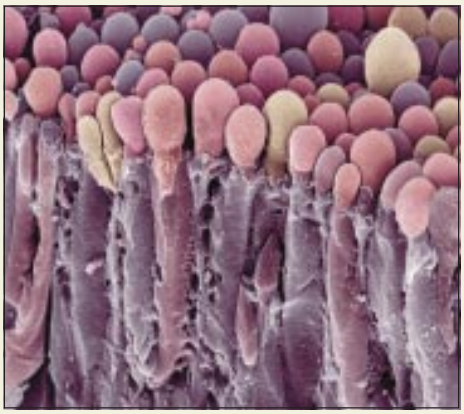
Science close up

Brain secretory cells, scanning electron micrograph by Stephen Gschmeissner—a first prize winner in the 2002 Novartis/Daily Telegraph "Visions of Science" photographic awards.



The swollen tips of these matchstick-like cells secrete a liquid (cerebrospinal fluid) which protects the brain and spinal cord from impacts. These cells are found in the choroid plexus, a layer that lines the cavities within the brain.