

Circumcisions for medical reasons in the Brazilian public health system: epidemiology and trends

Circuncisão por motivos médicos no sistema público de saúde do Brasil: epidemiologia e tendências

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ABSTRACT

Objective: To evaluate the epidemiological factors associated to medical circumcision, based on data from the Brazilian public health system. **Methods:** Using the Unified Health System public database between 1984 and 2010, hospital admissions associated with surgical treatment of phimosis were searched. A total of 668,818 men admitted to public hospitals who underwent circumcision were identified and included in the present study. **Results:** A mean \pm standard deviation of 47.8 ± 13.4 circumcisions/100,000 men/year was performed through the Unified Health System for medical reasons. During the 27-year period evaluated, 1.3% of the male population required circumcision for medical reasons. Total number of circumcisions and circumcision rate increased in childhood, declined progressively after 5 years of age and rose again progressively after the sixth decade of life. In the regions of the country with better access to healthcare, 5.8% of boys aged 1 to 9 years old required circumcisions. From 1992 to 2010 there were 63 deaths associated with circumcisions (mortality rate of 0.013%). **Conclusion:** In conclusion, yearly circumcision rates could be estimated in Brazil, and a very low mortality rate was associated with this procedures. Circumcision is mostly performed in children in the first decade of life and a second peak of incidence of penile foreskin diseases occurs after the sixth decade of life, when circumcision is progressively performed again.

Keywords: Circumcision, male; Phimosis; Unified Health System; Prevalence; Child; Adult; Brazil

RESUMO

Objetivo: Avaliar os fatores epidemiológicos associados à circuncisão por motivos médicos, tendo por base os dados do sistema público de saúde do Brasil. **Métodos:** Utilizando os dados públicos do Sistema Único de Saúde de 1984 e 2010, foi realizada busca de admissões hospitalares associadas ao tratamento cirúrgico da fimose. Um total de 668.818 homens admitidos nos hospitais públicos e submetidos à

circuncisão foram identificados e incluídos neste estudo. **Resultados:** A média \pm desvio padrão de $47,8 \pm 13,4$ circuncisões/100 mil homens por ano foi realizada no Sistema Único de Saúde por razões médicas. No período de 27 anos em que o procedimento foi avaliado, 1,3% da população masculina necessitou de circuncisão por indicação médica. O número total de circuncisões e a taxa de circuncisões aumentou na infância e decaiu progressivamente depois de 5 anos de idade, voltando a aumentar após a sexta década de vida. Nas regiões do país com melhor acesso aos serviços de saúde, 5,8% dos meninos de 1 a 9 anos de idade necessitaram de circuncisões. De 1992 a 2010, houve 63 mortes associadas à circuncisão, com taxa de mortalidade de 0,013%. **Conclusão:** Por meio do presente estudo, foi possível estimar as taxas de circuncisão anuais no Brasil, e uma taxa de mortalidade muito baixa foi associada a esses procedimentos. As circuncisões são realizadas mais frequentemente em crianças na primeira década de vida, e um segundo pico de incidência de doenças no prepúcio ocorre depois da sexta década de vida quando a circuncisão é progressivamente realizada novamente.

Descritores: Circuncisão masculina; Fimose; Sistema Único de Saúde; Prevalência; Criança; Adulto; Brasil

INTRODUCTION

Circumcisions are performed for three main reasons: as a religious or cultural practice^(1,2), as a prophylactic measure⁽³⁻⁶⁾ or for treating medical conditions⁽¹⁾. The most common medical indications for circumcision include phimosis, paraphimosis, chronic or recurrent balanoposthitis, balanitis xerotica obliterans, preputial neoplasms and tears in the frenulum⁽²⁻⁶⁾. It is estimated that one in every three men in the world has been circumcised for one of these reasons⁽¹⁾. However, few studies demonstrated the percentage of men who

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need to undergo circumcision for medical reasons. In Brazil, religious or prophylactic circumcision is not widely performed⁽²⁾ and, in the public health system, circumcisions are performed exclusively for medical reasons.

OBJECTIVE

The aim of the present study was to evaluate epidemiological factors associated with medical circumcision, based on data from the Brazilian Unified Health System (SUS, acronym in Portuguese) during a 27-year period.

METHODS

Data from Unified Health System Database (DATASUS) were assessed from 1984 to 2010 as the primary source for this cross-sectional study⁽⁷⁾. DATASUS represents the primary effort of the federal government to collect data from the national health system. This database includes information from all public hospitals throughout the country. Using the DATASUS database between 1984 and 2010, we searched hospital admissions associated to surgical treatment of phimosis and circumcisions. A total of 668,818 men admitted to public hospitals who underwent circumcision were identified and included in the present study. Patients treated from 1992 to 2010 were divided according to year of treatment, age and ethnicity (prior to that period these pieces of information were not available). Data from 2001 and 2002 were excluded from analysis, since during these years data are confusing and incomplete for technical reasons (changes in the system and codification). The number of men diagnosed with penile cancer was also assessed through the DATASUS, and compared to circumcision rates for each Brazilian demographic region. Brazil is divided into five distinct demographic regions (North, Northeast, Central-West, Southeast and South). The regions were also grouped according to their demographic similarities as Northern (North, Northeast and Central-West) and Southern areas (Southeast and South) for further analyses. Demographic data from the Brazilian population were obtained from the two last national censuses, in 2000 and 2010, and population data from previous years were also collected from the Brazilian Institute of Geography and Statistics (IBGE)⁽⁸⁾. When evaluating ethnicity and circumcisions performed, we corrected for the total number of circumcisions and the total number of male admissions during the period evaluated (2008-2010). We have considered the majority of the Brazilian population as white for comparison purposes.

Statistical analysis was performed using Statistical Package for the Social Sciences (SPSS) 13.0 (SPSS for Mac OS X, SPSS, Inc., Chicago, Illinois). Groups were compared using the Pearson χ^2 test and analysis of variance (ANOVA). Statistical significance was determined at $p < 0.05$.

RESULTS

A mean \pm standard deviation of 47.8 ± 13.4 circumcisions/100 thousand men per year (range 26.2 to 78.0) were performed in the public health system in Brazil for medical reasons. During the 27-year period evaluated, 1.3% of the male population of SUS required circumcision for medical reasons (668,818 surgeries). Considering only boys aged 1 to 14 years, a circumcision rate of 0.14% of boys per year was observed, meaning that 2.1% of all Brazilian boys treated by SUS had to undergo circumcision in a 14 year-period. Considering only boys with ages ranging between 1 and 4 years, a circumcision rate of 0.24% per year was found or 1.1% of all boys were circumcised in a four-year period. Total number of circumcisions and circumcision rate increased in childhood, declined progressively after 5 years of age and rose again progressively after the sixth decade of life (Table 1, Figure 1; $p < 0.0001$). The rates of circumcisions/male hospital admissions in the five distinctive geographic regions of the country, from 2008 to 2010, varied significantly ($p < 0.01$), with a higher rate in the Southeast region (74.7 ± 8.3 ; $p < 0.001$). In this region, 0.48% of boys aged 1 to 9 years underwent circumcisions per year, and 5.8% in a 9-year period. When comparing Southern and Northern regions of the country, there was a larger number of circumcisions performed in the Southern regions ($p < 0.001$). When additional analysis was made for the number of penile cancer cases in both regions (459 versus 594, respectively) an inverse relation was observed ($p < 0.001$; Figure 2). According to ethnicity, when comparing to white men, Asian individuals required 25% more circumcisions, Black men required 8% more circumcisions and Indigenous required 57% less circumcisions (Table 2). From 1992 to 2010 there were 63 deaths during hospital admissions for circumcisions (mortality rate of 0.013%), varying from 1 to 9 deaths per year (rates of 0.004 to 0.031%). The mortality rates were progressively higher according to age groups (> 1 year: 0% versus 1 to 4 years: 0.002% versus 5 to 10 years: 0.001% versus 11 to 14 years: 0.002% versus 15 to 19 years: 0.010% versus 20 to 29 years: 0.008% versus 30 to 39 years: 0.020% versus 40 to 49 years: 0.048% versus 50 to 59 years: 0.101% versus 60 to 69 years: 0.180% versus 70 to 79 years: 0.280%

Table 1. Distribution of circumcisions performed between 1992 and 2010 per age group, Brazil (n=493,400; p<0.0001)

Age group (years)	Mean number of circumcisions/year	Circumcision rate x 100,000 men	CI95%
<1	878	91.0	90.3-91.7
1-4	9,298	235.6	235.4-235.7
5-9	8,292	155.4	155.2-155.5
10-14	4,594	75.2	75.1-75.3
15-19	1,625	27.1	27.1-27.2
20-29	2,051	17.1	17.1-17.2
30-39	865	8.5	8.5-8.6
40-49	483	5.7	5.7-5.8
50-59	349	5.7	5.6-5.8
60-69	295	8.0	7.9-8.1
70-79	189	9.8	9.6-9.9
≥80	96	12.1	11.8-12.3

CI95%: confidence of interval of 95%.

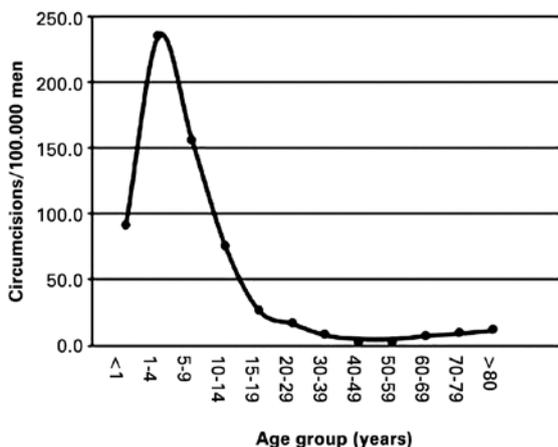


Figure 1. Average number of circumcisions per 100,000 men in the public Unified Health System per age at time of surgery, Brazil, 1992-2010 (n=493,400)

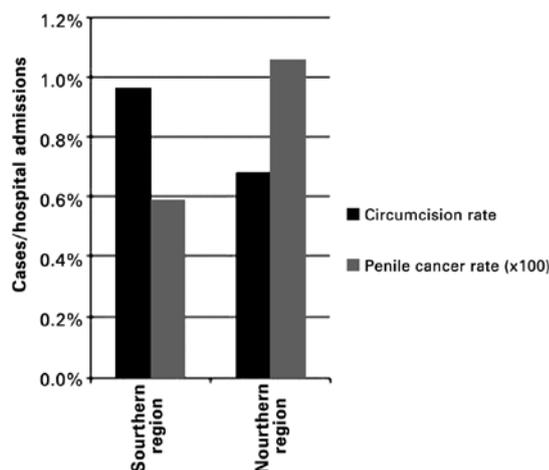


Figure 2. Rates of circumcisions/male hospital admissions and penile cancer/male hospital admissions (x100) in the Southern versus Northern regions in Brazil, 2008-2010

Table 2. Distribution of circumcisions according to ethnicity in Brazil, 2008-2010

Ethnicity	Number of circumcisions	Total male admissions in public hospitals	Circumcision/hospital admission rate	OR
White	37,606	4,693,726	0.80	1.00
Black	33,099	3,833,765	0.86	1.08
Asian	627	62,744	1.00	1.25
Indigenous	160	45,798	0.35	0.43
Not informed	41,901	4,766,198	0.88	1.10
Total	113,393	13,402,231	0.85	p<0.001

OR: odds ratio.

versus 80 or more years: 0.799%; p<0.001). Mortality rates were higher in the Northern regions as compared to Southern areas in Brazil (0.026% versus 0.015%; $\chi^2=4.18$; p=0.041). Specific clinical information about these patients on the causes of death is not available in the DATASUS; there is only a general reference to hospital mortality.

DISCUSSION

Circumcisions can be performed for cultural/religious reasons, as a prophylactic measure or for medical reasons. As a large number of men worldwide are circumcised^(1,2), it is difficult to estimate the requirement of the procedure for medical reasons in a male population. In Brazil, prophylactic or religious circumcisions are seldom performed, and never in the public health system for these indications. Moreover, national censuses⁽⁸⁾ and public health system database⁽⁷⁾ enable analyzing these numbers. These peculiarities allowed us to estimate rates of circumcisions performed exclusively for medical reasons.

Our study has some important findings. First, we observed an average rate of 47.8±13.4 circumcisions/100 thousands men yearly. In a 27-year period, 1.2% of men in Brazil had to be circumcised for medical reasons. If we consider exclusively the regions of the country with better access to the public health system, 1.9% of men were circumcised in a 27-year period. These rates are higher when evaluating children aged 1-9 years, of whom 5.8% were circumcised in a 9-year period. These numbers are similar to what was previously reported: 5 to 10% of children required circumcision^(9,10). It is important to reinforce that there are several difficulties and limitations for people who seek a specialist in SUS⁽¹¹⁾. There is a high number of Brazilian men or boys who would require circumcision if they were properly examined by specialists^(11,12), and therefore these figures would easily increase with better access to health services.

Second, age is a determining factor for indication of circumcision. As previously demonstrated, circumcision for medical reasons is more commonly required in children⁽⁴⁾. In many countries, it would be difficult to estimate the real need of circumcision for medical reasons⁽⁹⁾. For example, in the United States, almost 80% of the male population is circumcised as a newborn^(9,13). Since newborn circumcision is not routinely performed in Brazil, we could evaluate and confirm these findings in the Brazilian population. Children aged 1 to 9 years were 49 times more circumcised for medical reasons than the total male population. An interesting finding however is the second peak of circumcision. Circumcision rates decreased progressively after the first decade of life, stabilized between 40 to 59 years, and after the sixth decade of life progressively rose again. Even though most studies evaluating the benefits of neonatal circumcision focus on children, adults seem to have increasing problems with penile foreskin diseases with aging. In this population of men, the development of chronic diseases, such as diabetes, can lead to additional foreskin diseases and circumcision might be required⁽¹⁴⁾. This reinforces a possible additional benefit of early circumcision. Apart from preventing urinary tract infection, sexually transmitted diseases, balanoposthitis and penile cancer^(5,6,13), circumcisions performed prior to sexual initiation could additionally prevent the onset of penis diseases at an advanced age. We also demonstrated an inverse association between medical circumcision rates and penile cancer rates when comparing the Northern and Southern regions of Brazil. This finding might be associated with several factors, primarily the fact that in the Northern regions, where more cases of penile cancer occurred, the socioeconomic levels are lower and access to healthcare services is more difficult^(8,12). A possible explanation is that men from the Northern regions of Brazil that could not be circumcised, although it was required, have more penile cancer⁽¹²⁾.

Third, mortality rates were extremely low. There were 63 deaths from 1992-2010, with an overall mortality rate of 0.013%. Even low, these figures are higher than previous reports for neonatal circumcision, with no deaths in up to 417,282 boys circumcised^(15,16) ($p < 0,0001$). If considering only circumcisions in children aged less than 12 months of age, there were also no deaths in the present series. However, there are certain particularities of our study population that might contribute to these findings. Our data was obtained in a developing country, where hospital conditions are less favorable than in developed countries. Moreover, with increasing age, concomitant risk factors might be

present⁽¹⁴⁾. Mortality rates were increasingly higher per age and, in the less developed regions (Northern), mortality was almost twice as those in the Southern regions. This is an additional argument towards the benefits of neonatal circumcision, when complications are extremely rare and fatalities are almost anecdotal⁽¹⁶⁾. In the present series, ethnicity was associated to circumcision rates. Brazilian Black and Asian males required more circumcisions than White men, and Indigenous were the least circumcised. However we do not believe further conclusions can be withdrawn from these data, since more than one third of data regarding ethnicity were incomplete; furthermore, these findings might also be associated with some confounding factors, such as socioeconomic status and access to healthcare services.

This study has several limitations. The DATASUS registries do not provide clinical information, limiting further analysis. In addition, only public health system data could be analyzed, and therefore only 70% of the Brazilian population was evaluated. Men with access to private healthcare services may have different behaviors, and results could be different for this group of men. Nonetheless, to the best of our knowledge, this is one of the largest epidemiological studies about circumcision performed exclusively for medical reasons, and we believe these data can help further understanding the factors associated to the procedure for this indication. Several controversies about the risks and potential benefits of neonatal circumcision exist, however it is not the scope of the present article to evaluate these issues, but our findings can help to better understand these common medical situations and to establish preventive strategies.

CONCLUSION

In conclusion, it was possible to estimate circumcision rates in Brazil, and a very low mortality was associated with this procedures. Circumcision is mostly performed in children in the first decade of life and a second peak of incidence of penile foreskin diseases occurs after the sixth decade of life, when circumcision is progressively more performed again.

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