

An Epidemiological Study of Major Surgical Procedures in an Urban Population of East Delhi

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Abstract Surgery has become an integral part of global health care, with an estimated 234 million operations performed yearly. The World Bank in 2002 reported that an estimated 164 million disability-adjusted life years, representing 11% of the entire disease burden, were attributable to surgically treatable conditions. To study the prevalence of various surgical operations undergone by individuals in their life time, in an urbanized community of Delhi. Cross-sectional study, conducted from October 2008 to April 2009 in Vivek Vihar—an urban affluent colony in Delhi. A total of 3,043 individuals residing in 622 households were interviewed as part of the study. Total number of households with some member having ever undergone surgery was 306 (49.2%). 12.3% of our study population (375 out of 3,043) had undergone one or the other form of major surgical operation in their life time. Caesarean section was found to be the most common surgical procedure performed. 61.7% surgeries were elective in nature and 81.9% were performed in a private hospital. The lifetime prevalence of surgical procedures was 1.77% among children, 12.6% among adult males and 15.8% among adult females ($p < 0.001$). It was observed that the expense of surgeries conducted in private hospitals was more compared to government. Our findings suggest that surgery occurs at a substantial rate, at least among the urban affluent, with most of the patients choosing to refer to a private hospital for their surgery.

Keywords Surgical procedures · Prevalence · Urban · Delhi

Introduction

A significant proportion of the population has undergone one or the other forms of surgical procedures at one or more points in the life time of an individual. Surgery has become an integral part of global health care, with an estimated 234 million operations performed yearly. The World Bank in 2002 reported that an estimated 164 million disability-adjusted life years, representing 11% of the entire disease burden were attributable to surgically treatable conditions [1]. Surgery is performed in every community, wealthy or poor, rural or urban, and in every setting from the most resource rich to the most resource limited, and the need has increased greatly with the shifting patterns of disease. However, little is known about the actual worldwide volume and availability of surgical care since only anecdotal evidence exists.

In view of its complexity and risks, an understanding of the quantity and distribution of surgical interventions is therefore essential to guide efforts to improve its safety and redress shortages of such services. The most common types of surgeries found in the community are usually one or the other type of abdominal surgery, eye surgery etc and among the female population, caesarean section and hysterectomies. Among the geriatric population, cataract surgery is the commonest. Recognizing the importance of high prevalence of surgeries, W.H.O has recently launched efforts to initiate programmes for safe surgeries especially in developing countries [2]. Detailed incidence and prevalence data regarding different surgeries are extremely important in determining community surgical needs and in assessing the potential impact of intervention strategies.

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With this aim, we conducted a community based study to find out the prevalence of various surgical operations undergone by individuals in their life time in an urbanized community of Delhi.

Material and Methods

The study was conducted from October 2008 to April 2009, in a chosen residential colony in Delhi. The study area purposively selected was Vivek Vihar—an urban affluent colony situated in East part of Delhi. The colony is divided into four residential blocks, and all four were included in the study. Permission for carrying out the study was taken from the institutional ethics committee. A written permission was obtained from the presidents of resident welfare associations of all the four blocks of Vivek Vihar prior to conducting the study. Residential directory of the area was obtained from one of the member of resident welfare association of Vivek Vihar. A total of 1,121 houses were listed in the directory in all the four blocks which had an estimated population of 5,500 approx.

Out of 1,121 houses, every second house was selected for data collection. An extra 10% household was targeted for data collection assuming 10% non-response may occur. This gave a target sample of 616 households. All 25 students were allotted 25 houses each for data collection, so that the sample size requirement could be met. The data was collected over four consecutive weekends in Nov-Dec 2008. The weekends were chosen as the day of visit, to get the maximum number of the residents at their home. First three visits were done to collect a complete data of residents in the allotted houses of each data collector. The fourth visit was kept to revisit the houses which were locked/ residents not at home at previous visits. At each visit, 10 % of the data was randomly crosschecked by the investigators who were present as supervisors during the data collection.

The exclusion criteria were: a) Residents who were not willing to participate in the study, b) Residents whose homes were found locked even after three visits, c) Houses which were under construction and where commercial enterprises were found instead of residential quarters and d) domestic staff, if any, were excluded as they did not form a part of the family. During the study, there were three households that did not respond to the data collection and did not give consent for participation.

A pre-tested semi-open ended questionnaire was used in study for finding the prevalence of surgical procedures among the study population & socio demographic details of the study population. The head of the household was asked about the history of all family members; also the available medical records were asked for and cross-verified for diagnosis. All the students were given a list of major

surgical procedures along with a code. In case there was some problem in the diagnosis, help of supervisors was taken. A broad purposive practical definition was used to define major surgical procedures—“All the procedures which require indoor admission, irrespective of the duration of stay and the type of anesthesia used.” We excluded procedures that were reported as minor surgery and non-invasive procedures—e.g. respiratory therapy treatments or CT scans. We used a working practical definition as it was a field based survey so meticulous disease specific definitions would have been impractical to use.

Results

A total of 622 households were interviewed as part of the study and information collected on a total of 3,043 residents. The mean (\pm standard deviation) age of the residents was 36.6 (\pm 20.2) years. The age distribution is presented in Table 1. The residents whose data was enquired about consisted of 453 (14.9%) children (<15 years), 1,319 (43.3%) adult males and 1,271 (41.8%) adult females. In the present study, 86% were Hindu, 8% were Muslims and rest from other religions. Of the total residents by occupation 869 (28.6%) were housewives, 723 (23.8%) were students and 621 (20.4%) were businessmen. Assessing the education level it was found that a majority 1,665 (54.7%) of the residents were graduates. If we consider only the residents aged 20 years or more (i.e. those who have had sufficient chance to complete college), the proportion of graduates rose to 70.8%, which can be expected in an affluent colony.

Total number of households in which one or more residents had history of having ever undergone some surgery was 49.2% (306 out of 622). Total number of residents who had undergone surgery was 12.3% (375 out of 3,043). Out of 375 who underwent some or other kind of surgery, 8 were children of age less than 15 years, 166 were adult males and 201 were adult females. A total of 1.77% (8/453) among children, 12.6% (166/1,319) among adult

Table 1 Age distribution of the study population

Age group	Number	Percent
0–10 years	244	8.0
10–20 years	481	15.8
20–30 years	494	16.2
30–40 years	467	15.3
40–50 years	542	17.8
50–60 years	330	10.8
Above 60 years	485	15.9
Total	3,043	100.0

males and 15.8% (201/1,271) among adult females had undergone one or other kind of surgery in their life time. The total number of surgical procedures reported among the 375 residents with any history of surgery was 426, as an individual may have had more than one surgery in the past. Out of the 375 persons with history of some surgical procedure, 325 (86.7%) had undergone a surgery once, 49 (13.1%) twice and only one (0.3%) had undergone more than two procedures.

Table 2 enumerates the commonest surgical procedures that were reported by the study population. Among the 3,043 residents interviewed, the commonest procedures were Caesarean Section operation (3.32%) followed by cataract operation (1.41%), cardiac bypass surgery (1.05%), hysterectomy (1.05%), appendectomy (0.95%), cholecystectomy (0.92%) and hernia repair (0.89%). Ureteric stone removal, renal transplant, mastectomy, thyroidectomy, carcinoma/ tumor surgery had been carried out among 3–4 respondents each. Prevalence of emergency surgeries following accidents (ever in life so far) was found to be 0.53%. Several procedures were there that had been carried out among one or two respondents each. Overall, we listed 41 such named procedures among the respondents that included tonsillectomy, stapedectomy, valve repair, neurocysticercosis surgery, corneal repair among others. Out of the paediatric patients, only 8 children had a history of having undergone some or other kind of surgery, the reported surgeries included tonsillectomy, adenoidectomy, tympanoplasty, trabeculectomy etc. If we consider certain surgeries by age-sex specific groups, it gives better perspective on their prevalence. Considering only the adult

females (n=1,271) in the study population, prevalence of cesarean section was 7.95%, and hysterectomy prevalence was 2.52%. Considering the geriatric male population only (n=242), i.e. those 60 years and above, prostatectomy prevalence was 4.6%.

If the surgery is categorized according to the medical specialty/ system involved, among the 426 surgical procedures reported it was seen maximum number of surgeries were Obstetrics and Gynaecology related (32.4%). Next most common system was abdominal surgery (29.3%), cardiovascular (14.3%), ophthalmic (11%), orthopedic (5.4%), head & neck (3.5%) and surgeries involving other systems (4%).

In this study 61.7% surgery were elective in nature and rest 38.3% were emergency type. These included 3.75% surgeries that had been carried out on an emergency basis following an accident. Majority of the surgeries (81.9%) were carried out in the private hospitals, only 17.8% surgeries were done in a Government hospital and rest were in other hospitals like ESI hospital. This could be ascribed to the fact that Vivek Vihar colony has mainly people belonging to the higher socio-economic group. Classifying by type of anesthesia, around 58% surgeries were done under general anesthesia, 32% under local anesthesia and 10% surgery were performed under spinal anesthesia. The duration of post-op hospital stay was 4–7 days for most (43.9%) of the study population. Of the total, 8.2% respondents had to stay in the hospital for more than 15 days post-surgery. The expenditure incurred by the residents towards the surgical procedure(s) carried out among them is depicted in Table 3. It can be seen that 63 % of those with a history of surgical procedure had spent more than 10,000 rupees for their surgery.

The association between surgical procedures and age and sex of patients was found to be statistically significant. The prevalence among adult females was highest (15.8%), among adult males it was 12.6% and among children it was 1.77 % (chi square $\chi^2=61.5$, $df=2$, $p<0.001$). There was a significant association between expenses incurred by patients and type of hospital. The proportions of subjects

Table 2 Distribution of the common surgical procedures carried out amongst the study population (n=3043)

Procedure	Number	Percentage
Caesarian Section	101	3.32 ^a
Cataract	43	1.41
Cardiac bypass surgery	32	1.05
Hysterectomy	32	1.05 ^a
Appendectomy	29	0.95
Cholecystectomy	28	0.92
Hernia repair	27	0.89
Angioplasty	19	0.62
Emergency surgery following accident	16	0.53
Prostatectomy	11	0.36 ^b
Hip & knee replacement	9	0.30

^a Prevalence of cesarean section=7.9% and of hysterectomy=2.52% if we consider only adult females (n=1271)

^b Prevalence of prostatectomy=4.6% if we consider only geriatric males (n=242)

Table 3 Expenses incurred by the study subjects towards the surgical treatment (n=426 reported surgical procedures)

Expenses (in rupees)	Number	Percent
Nil	59	13.8
<1,000	7	1.6
1,000–4,999	13	3.1
5,000–9,999	78	18.3
10,000 or more	269	63.1
Total	426	100.0

reporting higher expenses for the surgery were significantly more for the private hospitals as compared to government hospitals (chi square $\chi^2=23.4$, $df=4$, $p<0.001$).

Discussion

Nearly 12.3% of the studied population of Vivek Vihar had undergone one or the other form of major surgical operation in their life time. Almost half of the studied households (49.2%) had at least one member with a past history of major surgical procedure. In the present study, Caesarean section was found to be the most common surgical procedure undergone by the study population and the prevalence was 3.32%. Previously, 32.6% prevalence of caesarean section (among the surgeries conducted) has been documented in a population based cross-sectional study conducted in South India [3]. In another study done by Bhasin et al, caesarean section rate was found to be 34.4% among all the deliveries carried out [4].

The prevalence of cataract surgery among the geriatric population (60 years or more) is the commonest which came out to be 10.1%. This prevalence seems to be on a higher side. This can be explained by the fact that though the aggregate proportion of geriatric population at the country level, (>60 yrs) is 7% but this was over 15% in our study population. As per the statistics released by American Heart Association (AHA), numbers of angioplasties outnumber bypass surgeries [5], but in our study Cardiac bypass surgery was prevalent in 1.05% which was greater than the prevalence of angioplasties. This can be explained by the fact that in India, bypass operations are still performed to a larger extent, to which one contributing factor is the lower cost implications vis-à-vis angioplasty procedure.

Hysterectomy prevalence was found to be 2.52% among the adult females ($n=1,271$) in the study population. Slightly higher rates have been reported in earlier Indian studies [6–9]. In comparison, the worldwide prevalence is reported to be 10–20% [10–13]. Indian rates are lower than the rates of other western countries. This can be explained on basis of other studies on uterine prolapse and menopause which had revealed that, for women in India, family responsibilities take precedence over their own health concerns. Even if they have any uterus-related disease, a desire to complete the desired family size often delays the decision to get one's uterus removed. So, in India, more often than not, the hysterectomy even if indicated and advised, is delayed till the children are old enough and women have a sense of having fulfilled their family commitments. Also higher tolerance threshold of Indian women and a 'low level of medicalization' have been proposed as the reasons for this lower rate [14, 15].

In our study, prevalence of cholecystectomy was found to be 6.6%. In a study done by Kennedy et al in London in 2002, the prevalence was 5.4%, the findings being similar to our study [16]. Lifetime prevalence of emergency surgeries following accidents was found to be 3.75%. The health infrastructure in India is not that well equipped which can take care of most of the accidents in an emergency manner with good success. Here the population has significant mortality and morbidities in accidents and so the number does reflect the need to strengthen the facilities more. Also not much advancement has been made in the field of super specialties in India which can take care of accidental injuries.

The present study had some limitations that make our estimates necessarily provisional. As lifetime-prevalence was asked about, there is likelihood of recall bias especially among the older respondents. Informants might not have told accurately the count of several operations in one patient.

Conclusion

In view of the substantial life-time prevalence of major surgical procedures, surgical safety should now be a substantial global public-health concern & also suggests a large disease burden worldwide. Our findings suggest that surgery occurs at a substantial rate, at least among the urban affluent, with most of the patients choosing to refer to a private hospital for their surgery. The prevalence of surgical procedures shows a greater need for public health efforts to improve the monitoring, safety, and availability of surgical services, especially in view of their high risk and expense. A public health strategy for surgical care is paramount.

Conflicts of interest None.

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