

## Prevalence of Amputation and Phantom Limb Sensation among Selected Amputees

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### Abstract

**Background:** Phantom limb sensation is one of the challenges of post-amputation surgeries that can dispose amputees to other challenges/complications like phantom pain, psychological trauma and unexpected falls. It is uncertain therefore whether the needs of amputees have been met in this area of their likely challenge.

**Aim:** The study was set out to investigate the prevalence of amputation and phantom limb sensation among different groups of amputees and also the measures adopted in helping them to cope with it.

**Methods:** A retrospective study was used to include amputees of age range 0 - 80 years who had received medical services from a Specialist Orthopaedic Hospital used for the study in the past 5 years. A total of 60 questionnaires were distributed to the amputees and 41 were returned answered questionnaires. The centers also gave access to the amputee's folders from which some of the information that were not supplied by the respondents were picked. The parents/guardians of pediatric respondents, who couldn't respond, helped to respond on their behalf, although the number of such cases was very minute. The data collected was analyzed, summarized, presented with tables and figures and deductions were made based on the findings.

**Results:** Of the 41 amputees, 28 (67.50%) were male, 13 (32.50%) were female. The age range is 0 - 80 years, while 61 - 70 years has highest frequency of 12 (29.2%), followed by 51-60years 10 (24.4%) while 11 - 20 years 1 (2.4%) has the lowest. The occupation that has the highest respondents is the Retirees 12 (29.3%), followed by motorcycle riders 8 (19.50%) while students were the least 2 (4.9%). The amputation types they benefited from ranged from below-knee 23 (57%), above-knee 9 (23%), above elbow 1 (2%), below elbow 1 (2%). 24 (57.50%) of the subjected reported presence of phantom limb, 10 (25%) reported of absence of phantom limb, while 7 (17.50%) reported of occasional presence of phantom limb. The use of crutches by bed-side (85.4%) took the lead in measures adopted to help the amputees cope with phantom limb sensation. This was followed by use of post-operative prosthesis (73.2%), while use of bed rails was (70.7%).

**Conclusion:** Phantom limb sensation is a common phenomenon among amputees, which affects their daily activities and life style. The study surveyed the occurrences of phantom limb sensation among amputees and measures that have helped them cope with it. The prevalence rate of phantom limb sensation among different categories of amputees was high and the measures of helping them live functionally with it, which were investigated, have also been useful to them.

**Keywords:** Prevalence; Amputation; Phantom Limb Sensation; Amputee; Improvement; Rehabilitation Approaches

### Introduction

Amputation is the surgical removal of one or more parts of the body and can occur or be done as a result of unprecedented havoc/natural disasters including accidents, earthquakes of minor intensities (in areas prone to that); terrorism and wars. It can also be carried out due to medical reasons with the aim of improving the health outcomes and quality of life of the patient involved [1].

Amputation can also occur as a result of religious activities as a punishment for crime committed by the amputee. A typical example is the Sharia Law Code [2].

Limb loss by an individual in developing countries like Nigeria where the prosthetic services is poor often has profound economic, social and psychological effects on the patient and their families [3,4].

A phantom limb is the sensation that an amputated or missing limb is still attached. Approximately 60 to 80% of individuals with an amputation experience phantom sensations in their amputated limb, and the majority of the sensations are painful. Phantom sensations may also occur after the removal of body parts other than the limbs, e.g. after amputation of the breast, extraction of a tooth (phantom tooth pain) or removal of an eye otherwise known as phantom eye syndrome [5].

Phantom limb sensation is experienced by almost everyone who undergoes limb amputation, but it is rarely a clinical problem. Immediately after amputation, the phantom limb often resembles the pre-amputation limb in shape, length, and volume. The sensation can be very vivid and often includes feelings of posture and movement. Over time, the phantom sensation may fade. In some patients, a phenomenon called ‘telescoping’ occurs when the distal part of the phantom is gradually felt to approach the residual limb and, in the end, it may even be experienced within the stump [6].

In some other literature, Phantom limb syndrome is a condition in which patients experience sensations in a limb that does not exist [7]. Some patients feel their amputated limb is entirely still present, and these patients can describe the posture in which it is held, feel that it moves around, and even does specific tasks. Patients sometimes continue to feel a wedding ring on an amputated finger, or that they are wearing a watch on their amputated arms. Others experiences are pain, tingling, or parasthesias. The phrase “phantom limb syndrome”, and the first clinical description of it, is the work of Silas Mitchell in 1872. Since then extensive research has been done in describing explaining and treating it. Most case reports describe “phantoms” in limbs, but there are reports of phantoms following breast amputation, parts of the face, and internal viscera. There are also descriptions of phantom erections and menstrual cramps after hysterectomy. Phantom limb syndrome has also been reported in congenitally missing limbs [7].

The phrase phantom limb syndrome encompasses both pain and other sensations in the amputated limb; phantom limb pain is approached as a separate clinical entity from phantom limb syndrome. Pain in the stump, called residual pain, or stump pain, is also considered separately in terms of both etiology and treatment [7].

Most people who've had a limb removed report that it sometimes feels as if the amputated limb is still there. This painless phenomenon, known as phantom limb sensation, may rarely occur in people who were born without limbs [7].

Phantom limb sensations may include feelings of coldness, warmth, or itchiness or tingling at the residual limb, but should not be confused with phantom pain [5]. Similarly, pain from the remaining stump of an amputated limb is not phantom pain. By definition, phantom pain feels as if the pain comes from a body part that no longer remains [6].

The exact cause of phantom pain is unclear, however Phantom limb syndrome increases in those that had a more prolonged period of pre-amputation pain, but it appears to originate in the spinal cord and brain. During imaging scans such as magnetic resonance imaging (MRI) or positron emission tomography (PET) portions of the brain that had been neurologically connected to the nerves of the amputated limb show activity when the person feels phantom pain [8].

Many experts believe phantom pain may be at least partially explained as a response to mixed signals from the brain. After an amputation, areas of the spinal cord and brain lose input from the missing limb and adjust to this detachment in unpredictable ways [9].

Studies also show that after an amputation the brain may remap that part of the body's sensory circuitry to another part of the body. In other words, because the amputated area is no longer able to receive sensory information, the information is referred elsewhere from a missing hand to a still-present cheek, for example [9].

So, when the cheek is touched, it's as though the missing hand also is being touched. Because this is yet another version of tangled sensory wires, the result can be pain [10].

A number of other factors are believed to contribute to phantom pain, including damaged nerve endings, scar tissue at the site of the amputation and the physical memory of pre-amputation pain in the affected area [10].

### Methods

A retrospective study was used to include amputees of age range 0 - 80 years who had received medical services from a Specialist Orthopaedic Hospital used for the study in the past 5 years. A total of 60 questionnaires were distributed to the amputees and 41 were returned answered questionnaires. The centers also gave access to the amputee's folders from which some of the information that were not supplied by the respondents were picked. The parents/guardians of pediatric respondents, who couldn't respond, helped to respond on their behalf, although the number of such cases was very minute. The data collected was analyzed, summarized, presented with tables and figures and deductions were made based on the findings.

### Result

A total of 60 questionnaires were sent to amputees in Christina Hospital and Royal Prosthetic and Orthotic Clinic in Owerri, Nigeria. Out of these, 41 were returned. There were 28 males and 15 females.

Figure 1 shows the amputation types the amputees benefitted from, with below-knee amputees having (27) of the population, followed by above-knee amputees (10) and the least were elbow (1) and above elbow amputees (1).

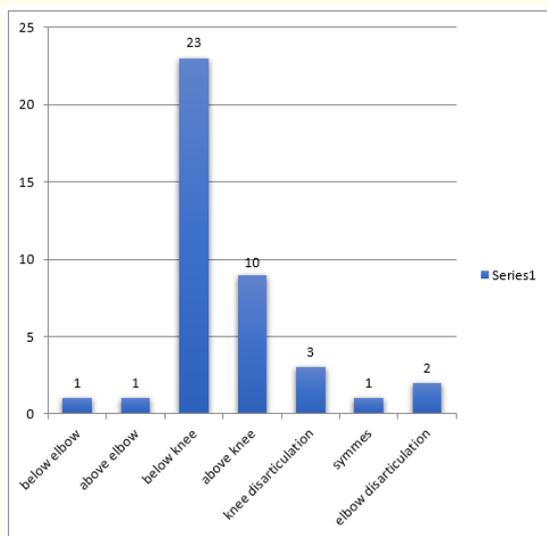


Figure 1: Amputation types of amputees.

Figure 2 shows that 57.5% of the respondents feel the presence of a phantom limb at the sight of amputation, 22.5% did not feel any phantom limb presence, while 17.5% sometimes felt the presence of a phantom limb.

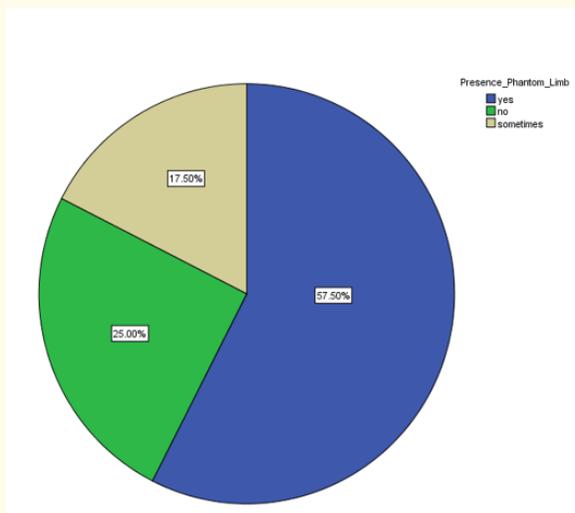


Figure 2: Presence of phantom limb.

Table 1 shows the frequencies of phantom limb sensation by age group, with age group 61 - 70 years (29.2%) having the highest frequency, followed by 51 - 60 years (24.4%), while age groups 0 - 10 years (4.9%) and 71 - 80 years (4.9%) were the least.

Age Range (years)	Frequency	%
0 - 10	2	4.9
11 - 20	1	2.4
21 - 30	2	4.9
31 - 40	5	12.2
41 - 50	7	17.1
51 - 60	10	24.4
61 - 70	12	29.2
71 - 80	2	4.9
Total	41	100

Table 1: Age group of respondents (years).

Table 2 shows the occupational distribution of the respondents, with the retirees (29.3%) having the highest frequency, followed by motorcycle riders (19.5%), while students (4.9%) is the least.

Table 3 shows the effectiveness of different approaches/measures adopted to help amputees cope with the presence of phantom limb sensation. Use of crutches by the bed side proved to be more effective (73.2%), followed by use of post-operative prosthesis (73.2%) and use of bed rails (70.7%).

Occupation	Frequency	Percentage (%)
Students	2	4.9
Retirees	12	29.3
Motorcycle Riders	8	19.5
Public Servants	6	14.6
Business People	4	9.8
Farmers	6	14.6
Artisans	3	7.3
Total	41	100

Table 2: Occupation of respondents.

Approach	Amputees' responses	
	Effective	Non-effective
Use of post-operative prosthesis	30 (73.2%)	11 (26.8%)
Use of crutches by the bed side	35 (85.4%)	6 (14.6%)
Use of bed rails	29 (70.7%)	12 (29.3%)

Table 3: Amputees' responses to approaches of managing phantom limb.

**Discussion**

Considering our purpose to determine the occurrences of phantom limb sensation among selected amputees and ways of helping them to cope with it in Eastern part of Nigeria, data was gotten from 41 amputees. It was observed that more males benefited from amputation than and females and was in line with a study done by Zamany, *et al.* in 2016 [11]. Majority of the phantom limb sensation do not require treatment and will recover within 2 to 3 years, but if it remains, phantom pain will appear [6,11]. Occurrences of amputation was highest within the age range of 61-70 years (29.2%), while age range of 11 - 20 years had the least occurrences (2.4%), which is similar to the study of Rommer, *et al* [12]. The occupation with the highest prevalence of amputation is retirees (29.3%), while students had the least (4.9%) and the most common amputation type in the study is below-knee amputation (57%) [13]. One of the major areas of the study is to find and determine better ways of helping amputees cope with the challenges of living with phantom limb sensation. In this aspect, 73.2% of the amputees reported that the use of post-operative prosthesis was effective for them, as it helped them to restore the physical presence of the limb. The use of post-operative prosthesis reassures the amputee psychologically and socio-economically and also reminds him/her of the physical absence of the limb. Amputees that used pos-operative prosthesis reported the disappearance of phantom sensation after an average of 8weeks. 85.4% reported that the use of crutches by their bed side was effective, as the presence of the crutches by their bed side frequently reminds them of the absence of their amputated limb and helps to prevent falls. This group of amputees that used crutched reported that they stopped feeling phantom limb sensation after an average of 12 weeks. 70.7% reported that the use of bed rails was effective, as it helps to guide them against standing up at nights to urinate and will be embraced by a fall. This reported that they stopped use of bed rails after 8weeks when it had been settled in their mind set that they are amputees and there was no need for the bed rail again.

**Conclusion**

Phantom limb sensation is a common phenomenon among amputees, with incidences seen across different levels and types of amputation, gender, occupation and ages of amputees. It poses some challenges to amputees; hence, the need to investigate which group of am-

Amputees are more susceptible and ways of helping them cope with becomes very pertinent. The study showed that phantom limb sensation is present in all the classes of amputees as grouped in the study and also a substantial portion of the study population benefitted from the measures adopted for the management of the phenomenon.

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